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TWENTY-FIFTH YEAR

OCT 17 1928

The Heating and Ventilating Magazine

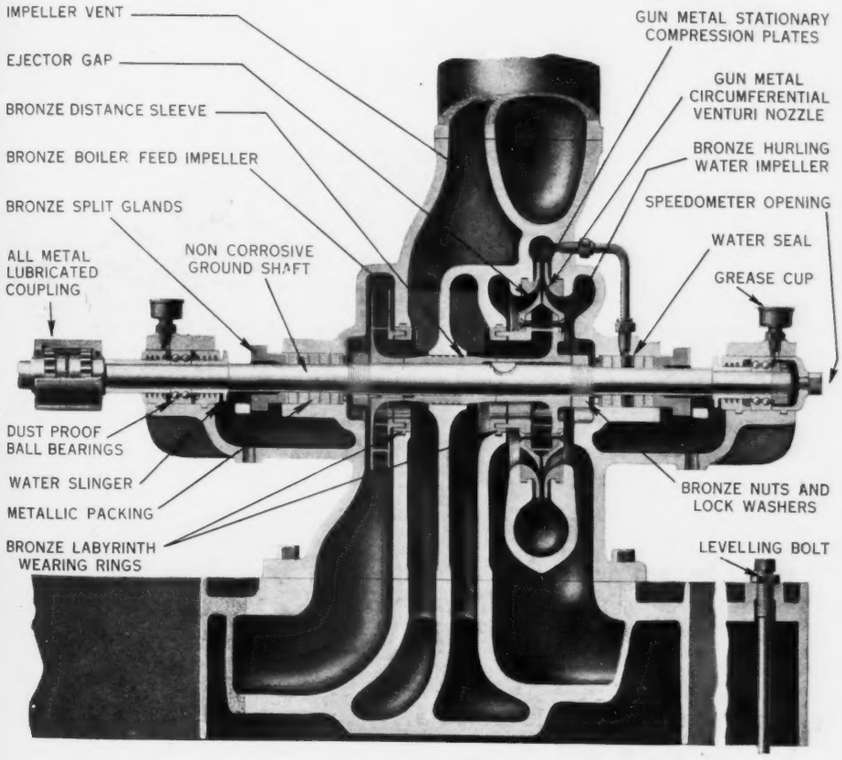
A Monthly Journal of Engineering Progress

XXV. No. 10.
0 a year. 30 cents a copy.

OCTOBER, 1928

Heating & Ventilating Magazine Co.
386 Fourth Avenue, New York.

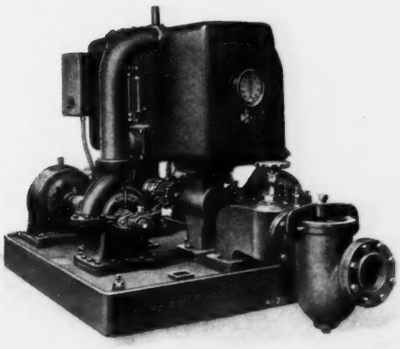
AMES VACUUM HEATING PUMP



Here is Engineering that really means service to the Owner

Backed by a THREE YEAR guarantee against wear

Write for Bulletin 52-C10

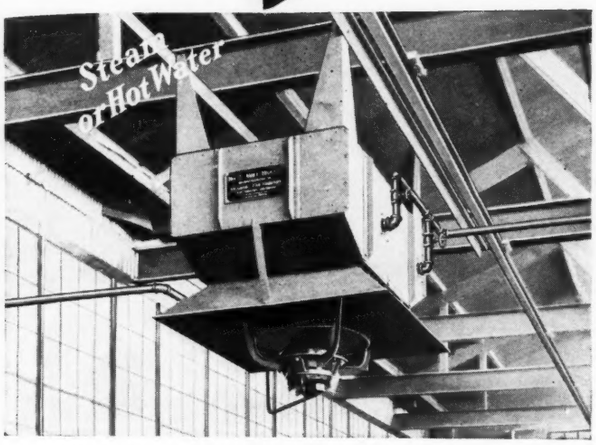


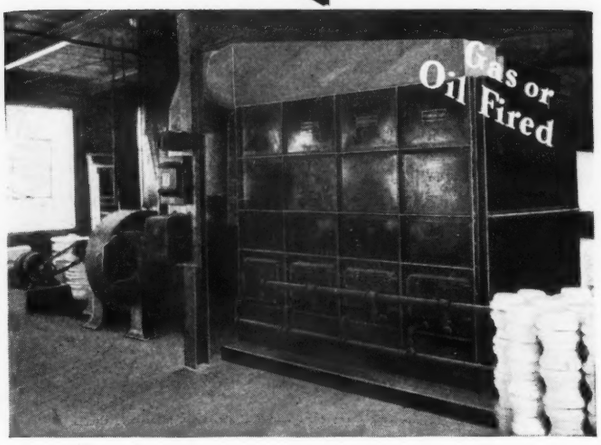
AMES PUMP COMPANY, Inc.

90 West Street New York, N. Y.

DISTINCTIVELY DIFFERENT

We Believe Factory Heating is Strictly an Engineering Problem





WHEN you select Clarage Unit Heaters for factory installation, you take no gamble. ***First,*** because Clarage Unit Heaters are sold only by direct Clarage representatives—sold exclusively by experienced fan heating engineers who are competent to analyze your problem correctly. ***Second,*** because Clarage engineers can draw upon a complete line of equipment in making recommendations—a line of unit heaters sufficiently diversified to meet your particular requirements, no matter how special, and produce results—a line scientifically designed for maximum economies, and honestly built.

We believe that factory heating should be handled strictly as an engineering problem. Further, we have the equipment and engineering personnel necessary to put this belief into practice. Clarage Unit Heater installations are successful installations. It will pay you to consult with us.

CLARAGE FAN COMPANY, Kalamazoo, Mich.

Sales Engineering Offices in Principal Cities

CLARAGE

UNIT HEATERS

KEWANEE STEEL BOILERS

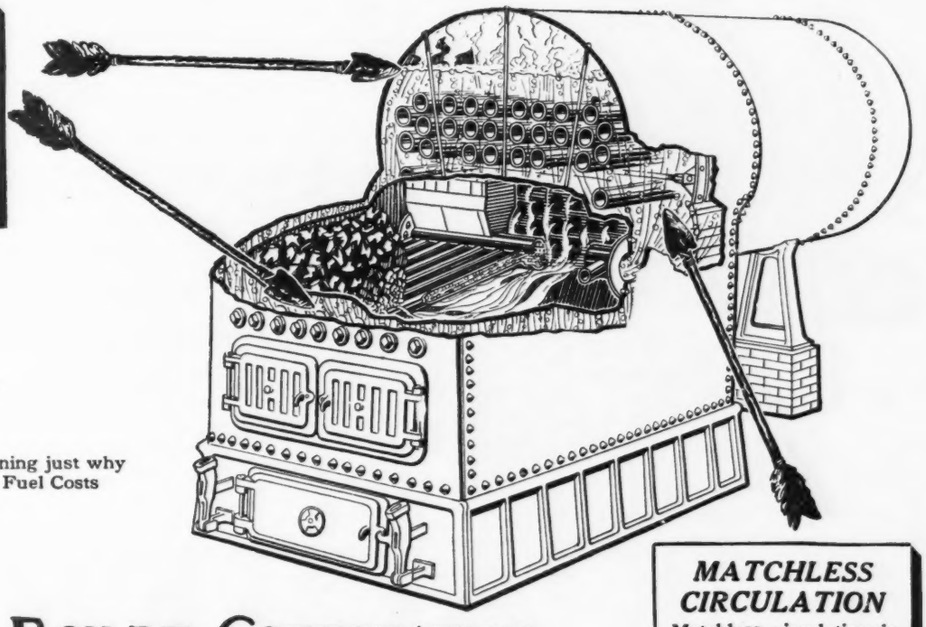
Lower Heating Costs

The right place for plenty of water is in the boiler and not in the steam lines and radiators. The Kewanee boiler style is not cramped, so the steam is delivered dry.

Kewanee provides ample volume of water in rapid circulation in the boiler, it is neither agitated into unmanageable commotion nor forced out into the steam lines by the liberated steam bubbles. It sticks to the job of absorbing heat from the heating surface. That is another reason why Kewanee is able to show *lower heating costs.*

WATER CONTENT

Water content is large enough to absorb all the heat of combustion without undue disturbance. So the water line keeps steady in the gauge glass.



Fifth of a Series—explaining just why Kewanee Boilers Cut Fuel Costs

MATCHLESS CIRCULATION

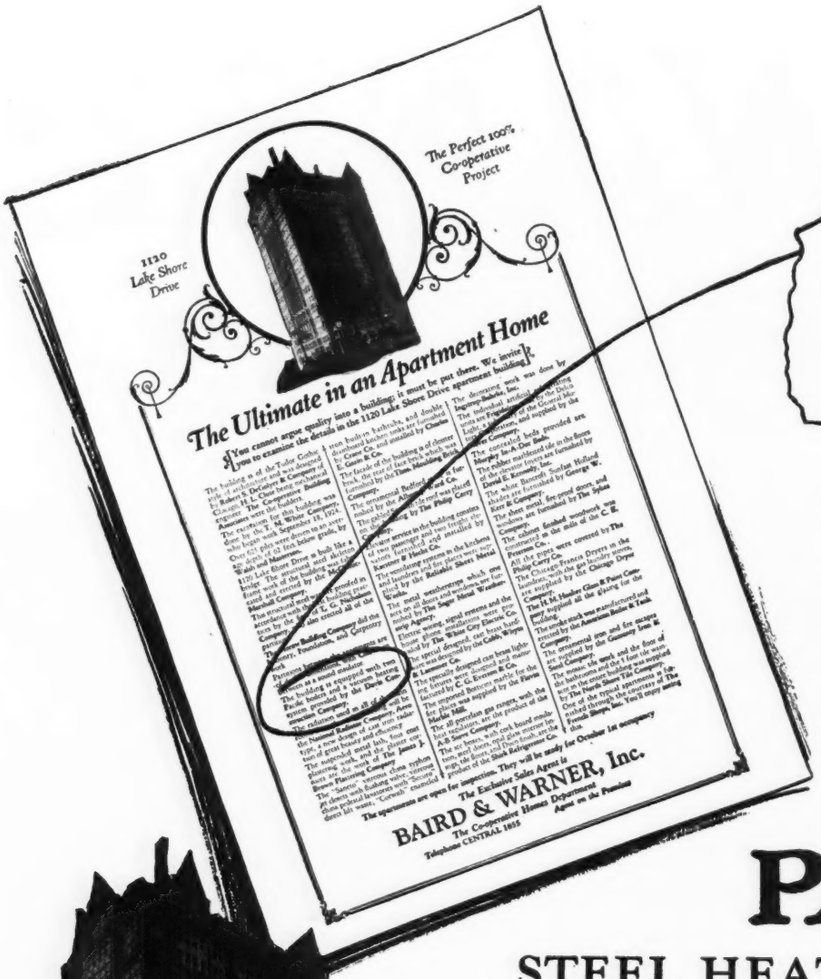
Matchless circulation is forced by the pumping action of the water grate and header built-in at the hottest fire zone.

KEWANEE BOILER CORPORATION

Kewanee, Illinois

Branches in 40 Principal Cities

THE HEATING AND VENTILATING MAGAZINE, published by THE HEATING AND VENTILATING MAGAZINE CO., at 386 Fourth Avenue, New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXV, No. 10, October, 1928. Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

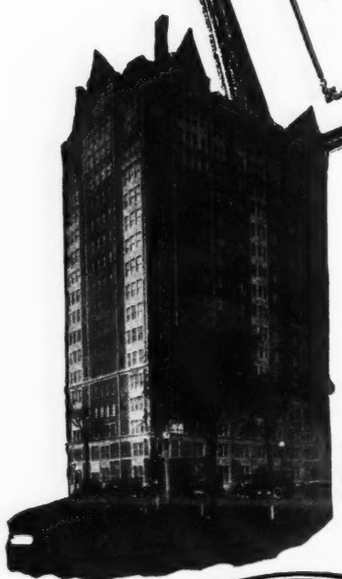


The building is equipped with two Pacific boilers and a vacuum heating system provided by the Davis Construction Co.

Realtors Know the Advertising Value of PACIFIC STEEL HEATING BOILERS

THE words "Pacific Heating" add much to the appeal of any advertisement. That is why such leading Realtors as Baird & Warner of Chicago play up these boilers when advertising their apartments.

The successful merchandising of large apartments like the one shown here, depends upon the quality materials and equipment used. Pacific Steel Heating Boilers give such talking points.



1120 Lake Shore Drive, built in Chicago's "Gold Coast" by Baird & Warner, Realtors.

STEEL HEATING BOILERS · PACIFIC · WAUKEGAN, ILL. BRISTOL, PA.

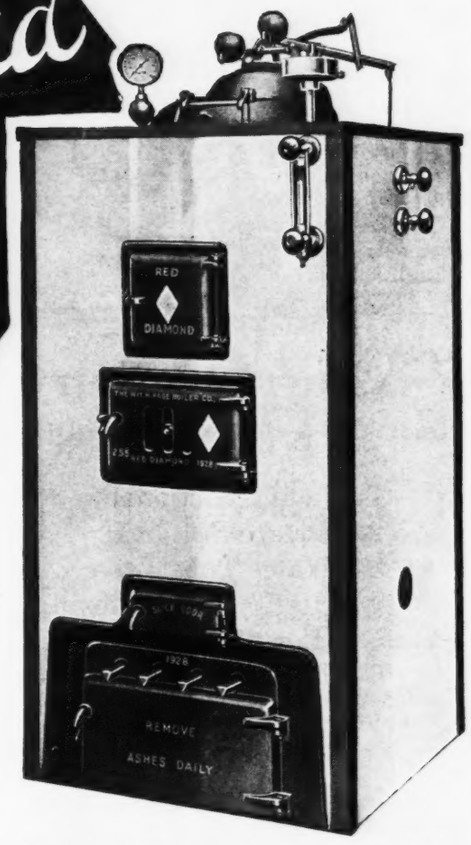
TRADE MARK REG. U.S. PAT. OFF.

PACIFIC

STEEL HEATING BOILERS

FACTORIES: WAUKEGAN, ILL., BRISTOL, PA.

The Page Red Diamond Jacketed Boiler



HERE is a boiler that will deliver an abundance of warmth, throughout the house, at a minimum outlay for fuel. A round boiler, for greatest efficiency and ease of operation, encased in a lustrous red enameled jacket that will be a bright spot in the cellar, and provide double insulation.

The Red Diamond Boiler is a Page product, built from the accumulated experiences of more than 70 years, and proved under the most exacting service conditions on thousands of heating installations. Yet this boiler is priced most advantageously.

There is satisfaction in the installation of this Red Diamond, the Ace of Jacketed Boilers.

Write for descriptive Pamphlet 54*A*

The Wm H Page Boiler Co

THE WM. H. PAGE BOILER COMPANY
***General Offices*: 200 Madison Avenue, New York City**

BRANCH OFFICES AND WAREHOUSES:

BOSTON, 123 Beverly St.
CLEVELAND, Rose Bldg.
BROOKLYN, 98—49th St.
PHILADELPHIA, 1126 Washington Ave.
WASHINGTON, 1117—15th St., N. W.
Factory: MEADVILLE, Pennsylvania

Designed To Win The Heating Race

Burnham Boilers

A Burnham Entry In Every Class

1—Round Sectional
2—Square Sectional
3—Water Tube Type
4—Big Twin Sectional
5—High Pressure*
6—Junior*
7—Laundry Stove*
8—Smokeless

*For Hot Water Supply

The Extra Length Of Fire Travel Is The Balloon-Jib Of The Burnham

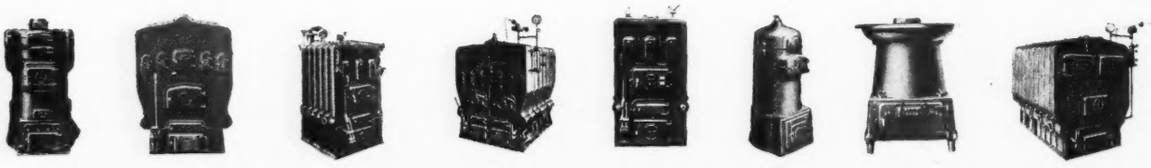
Like a splendid racer, with all sails set and pulling, the Burnham comes booming down the wind, when it's nip and tuck which boiler will win.

That precious extra length of fire travel is the one more sail that holds the lead on every leg of the course.

More heat, without an ounce more fuel. Less work for the crew, and a big purse to divide between owner and sailing master. That's you.

You're sure of the winnings from the crack of the starter's gun—just as sure as you are that no other craft is going to have a fire travel sail spread to equal yours.

Have the whole fleet of Burnhams, with a winning entry for every heating race.



(1) (2) (3) (4) (5) (6) (7) (8)

Burnham Boiler Corporation

IRVINGTON, N. Y.

Representatives in all Principal Cities of the United States and Canada

Stanwood Smokeless Boilers

Lower heating costs by reducing fuel costs!

Efficient and complete consumption of fuel in Stanwood Smokeless Boilers results in the utilization of every possible heat unit and produces the largest possible amount of heat to be had from the least amount of fuel.

This high efficiency, in conjunction with other exclusive features, is due to the performance and construction of the down-draft furnace.

Not only can savings be made when burning coal, but also when using oil or gas for which the Stanwood is adaptable.

Built in sizes from 29 to 250 H.P. (3500 to 31,000 sq. ft. steam radiation) for working pressures of 15, 100, 125 and 150 lbs.

Write Dept. D-108 for information giving size and pressure.

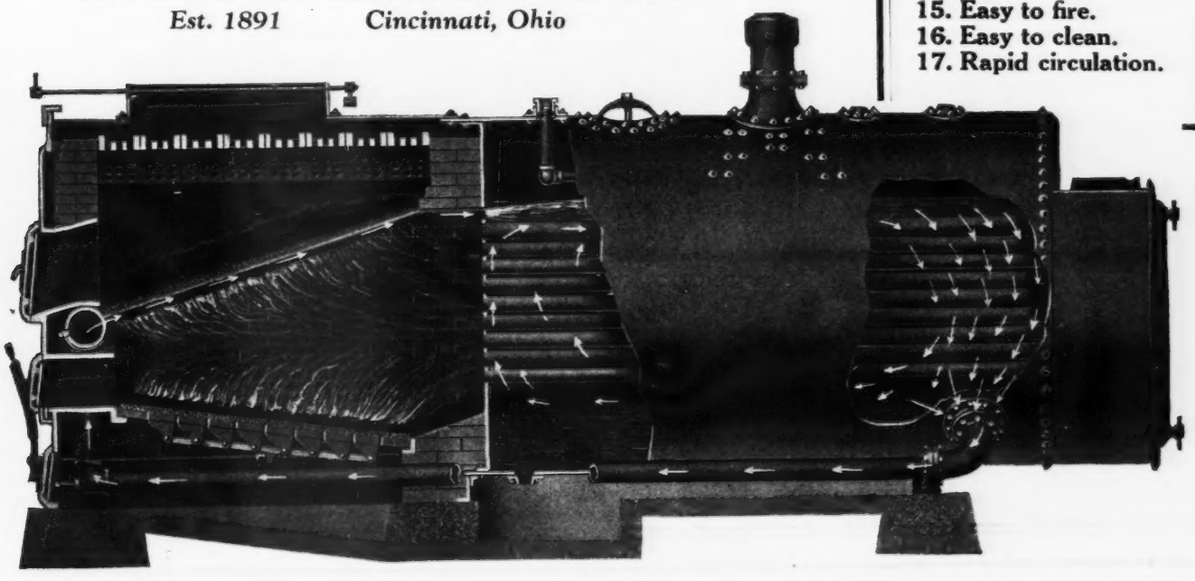
17 Superior Features

1. Installation in 3 to 4 days.
2. Small space required for installation.
3. Low 48 to 75 inch water line.
4. No outside bricks—minimum standard inside.
5. Down-draft furnace.
6. No air leaks.
7. Slight radiation losses.
8. Quick steaming.
9. Low stack temperature.
10. Smokeless.
11. Low head room.
12. No staybolts.
13. No mudlegs.
14. No crown sheet to sag.
15. Easy to fire.
16. Easy to clean.
17. Rapid circulation.

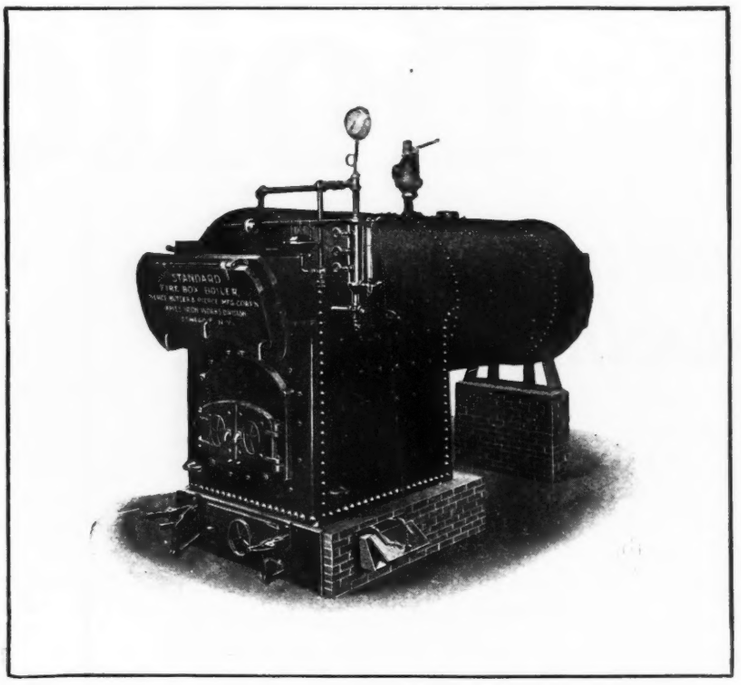
The STANWOOD CORPORATION

Manufacturers also of Horizontal Return Tubular Boilers, Stacks, Breechings, Tanks, Feed Water Heaters, Throttling and Automatic Steam Engines.

Est. 1891 *Cincinnati, Ohio*



AMES



FIREBOX HEATING BOILERS

AMES IRON WORKS

Division of

PIERCE, BUTLER & PIERCE
MANUFACTURING CORPORATION

Main Office and Works
OSWEGO, N. Y.

General Sales Offices
41 EAST 42nd STREET, NEW YORK CITY

Make your profits climb up-hill even faster than your sales

Everybody wants more business. The easiest way to make money is to make more sales—but the idea has one drawback. Some heating contractors want more sales so badly that they will cut profit down to nothing to get business. That way, the more sales they make the more they lose.

You can increase your sales and increase profits even faster. There is a simple, proven selling plan that successful contractors use—and that is to submit an alternative bid on a Spencer Heater on every job.

You take no chance—for you will get the business anyhow if your regular bid is low. If you convince your prospect that he should install the Spencer that he needs, you make a bigger sale with a larger profit. The first cost of Spencer is somewhat higher, and that makes the individual sale bigger. The larger the sale the larger the profit, and with a Spencer you get *all* your profit, for you don't have to shave your price as low as you must on ordinary heaters that everybody bids on.

Home and building owners are glad to pay the slightly higher first cost of a Spencer when you show them how much it saves. Explain this saving. Take No. 1 Buckwheat anthracite as an example. Explain that it costs an average of $6 less a ton than egg, stove and nut anthracite. Explain that the Spencer burns Pea and Buckwheat coke or any small size non-coking graded fuel at proportionate savings.

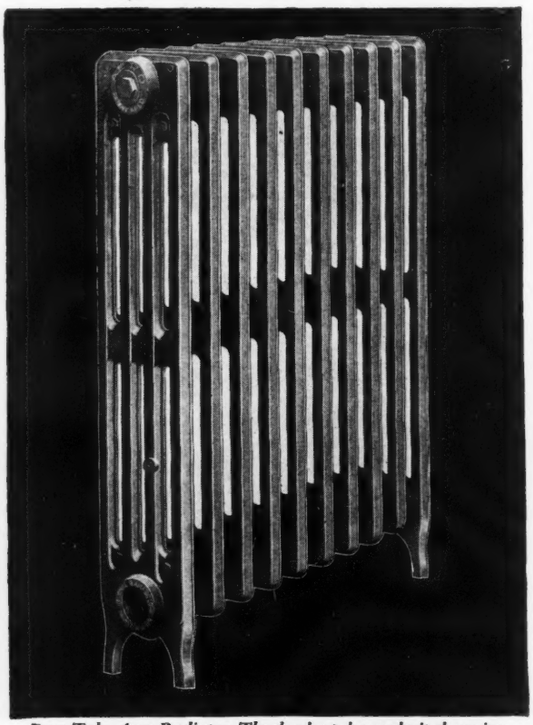
Spencer saving alone will land you many a job that would otherwise go to a lower bidder—even if you say nothing about the convenience of the Spencer Magazine that requires attention only once or twice a day.

When you build a fire in a fireplace, where do you put the kindling? At the bottom, of course. And that is where you light the fire—for fire burns *up*. The Spencer Gable-Grate is sloped to make fire burn up-hill, the way it burns easiest and best.

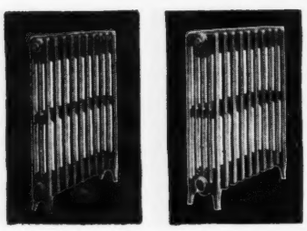
You've seen logs burn through and fall between the andirons. Suppose you could place a store of logs above the fire. As soon as one burned through, another would roll down to take its place. That's how the Spencer Magazine feeds fresh fuel to the sloping Gable-Grate.

Lift your business above competition by specializing on Spencers. You'll make more sales, you'll make larger sales, and you'll see better profits—for the larger the sales the larger the profits. Send for details of the new Spencer co-operative selling plan. Many contractors are already using it to make their profits climb even faster than their sales. Spencer Heater Company, *Division of Lycoming Manufacturing Company,* Williamsport, Pa.

SPENCER
steam, vapor or hot water
HEATERS

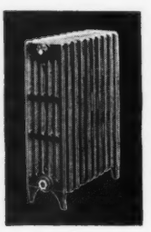


Four Tube Aero Radiator. The slender tubes make it charming and efficient; provide the scientifically correct ratio of air space to heating area.

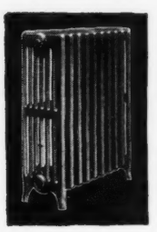


Three Tube Aero Radiator. Graceful, and pleasing, it is particularly adapted to narrow corridors, and rooms where space is at a premium.

Five Tube Aero Radiator. This model finds its field of use in all general applications: Homes, schools, apartments, offices and everywhere.



Six Tube Aero Radiator. Provides an unusual amount of radiating surface, but being only nine inches wide takes up very little space.



Seven Tube Aero Radiator. A unit with tremendous warming capacity which is used where space limitations will not permit a long radiator.

THE RADIATOR THAT SET NEW STANDARDS

Aero, the National Radiator, was the first to successfully combine beauty and efficiency, and revolutionized the cast iron radiator industry. Aero created a new appreciation of what radiators should be. Aero pioneered in standardization, introducing—in five models—a type and style for every application. For more than six years, Aero, the National Radiator, has led the field consistently. Imitated and followed, today it is the only tube type radiator whose value and dependability have been proven over a period of years in all types of buildings all over the nation. Aero, a National Product, is the National Radiator.

NATIONAL RADIATOR CORPORATION

MANUFACTURER OF RADIATORS AND BOILERS

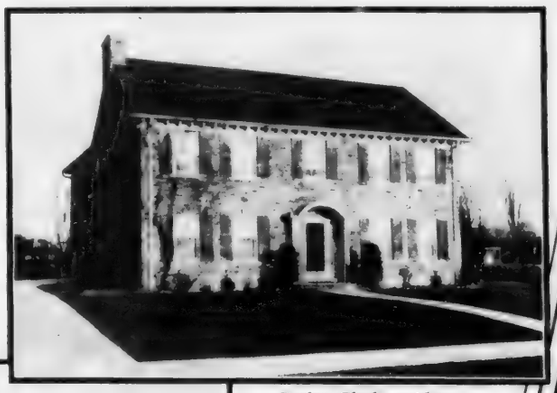
Nine Plants devoted to National Service through these Branch Offices and Warehouses:

Baltimore, Md.—2600-2622 Matthews St. Boston, Mass.—93-97 Oliver St. Buffalo, N. Y.—259-265 Delaware Ave.
Chicago, Ill.—2445 N. Keeler Ave. Cleveland, Ohio—935 E. 63rd St.
Cincinnati, O.—Spring Grove & Elmira Ave. Indianapolis, Ind.—431 W. Georgia St. Johnstown, Pa.—221 Central Ave.
Milwaukee, Wis.—124-130 Jefferson St. New York, N. Y.—55 W. 42nd St.
Omaha, Neb.—108-112 S. Tenth St. Philadelphia, Pa.—121 N. Broad St. Pittsburgh, Pa.—1509 Arrott Bldg.
Richmond, Va.—3032 Norfolk St. St. Louis, Mo.—1042 Central Industrial Ave.
Washington, D. C.—2205 Fifth St., N. E.

AERO THE NATIONAL RADIATOR

ROSS STEEL BOILERS

Leonard Willeke residence.
Grosse Pointe Village,
Detroit, Michigan.
McConachie & Reid,
Heating Contractors.



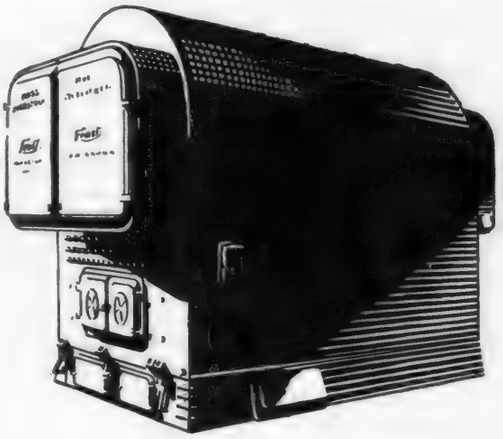
Rufus Clark residence,
Grosse Pointe Village.
Detroit, Michigan.
H. Buckeridge & Son,
Heating Contractors.

Oscar Webber residence, Grosse Pointe Shores, Detroit, Michigan
Harrigan & Reid, Heating Contractors.

The above photographs represent the type of homes that find ROSS STEEL HEATING BOILERS entirely satisfactory . . . . . .

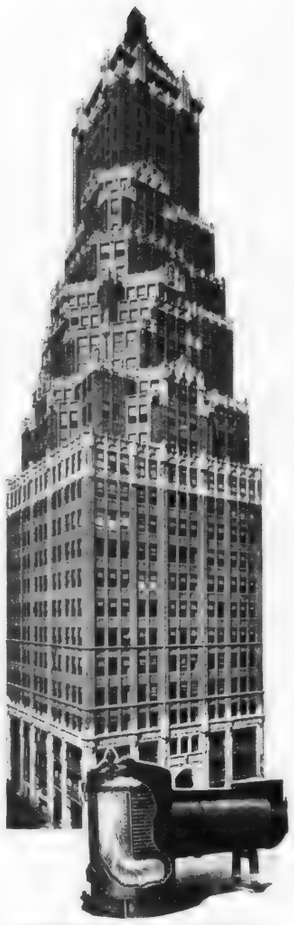
The Frost Manufacturing Co.
SINCE 1851

Branches in most leading cities. GALESBURG, ILLINOIS



from Cozy Home to Skyscraper a FITZGIBBONS ***Steel*** HEATING BOILER

in the basement means economical, dependable heat in the building



Chamber of Commerce Building, Brooklyn, N. Y.
3-200 H.P. and 1-60 H.P. Fitzgibbons ***Steel*** Boilers.

SINCE 1886 Fitzgibbons ***Steel*** Heating Boilers have been recognized by America's foremost Engineers as pre-eminent in design and superior in construction. Now Fitzgibbons ***Steel*** Heating Boilers and Fitzgibbons ***Steel*** Smokeless Heating Boilers are built in sizes down to 300 sq. ft. Steam Rating, so that all the characteristic advantages of Fitzgibbons scientific design plus modern ***Steel*** construction are available for every building small or large, modest or costly. The cost of *buying* a Fitzgibbons ***Steel*** Heating Boiler, in the medium and larger sizes, is less than that of an ordinary cast iron boiler, and but slightly more in the smallest sizes, while the cost of *owning* the Fitzgibbons ***Steel*** Boiler is much less, since under usual conditions it will save from one to two fifths of the fuel required by the cast iron boiler and is practically free from maintenance expense thruout the life of the building.

Complete information, sizes and capacities will be forwarded promptly upon request.

FITZGIBBONS BOILER CO., INC.
570 SEVENTH AVENUE
NEW YORK, N. Y.

You will find TICO BOILERS in all of these PROMINENT NEW YORK CITY BUILDINGS

– erected under the supervision of

FRANK S. PARKER, ARCHITECT AND ENGINEER
280 MADISON AVE., NEW YORK

Friedman Building - Two T - 161 Tico Boilers

Graphic Arts Building - Three T-250 Tico Boilers

Margolies Building - Two T-72 Tico Boilers

Warren-Nash Service Station-Two 250 hp. Tico Boilers

"Printing Arts Center"
Four 250 HP Tico Boilers

UPON the unexcelled performance record of Titusville Boilers, their remarkable fuel economy and their high heating efficiency hinges the sound judgment of many careful architects and builders.

Note, for example, these Tico equipped New York City buildings. They combine beautiful architectural exteriors with warm and comfortable interiors—for Tico Boilers are designed with ample heating capacity to meet the sudden fluctuations of winter's coldest temperatures.

Why not incorporate the particular advantages of Tico Boilers in your next building?

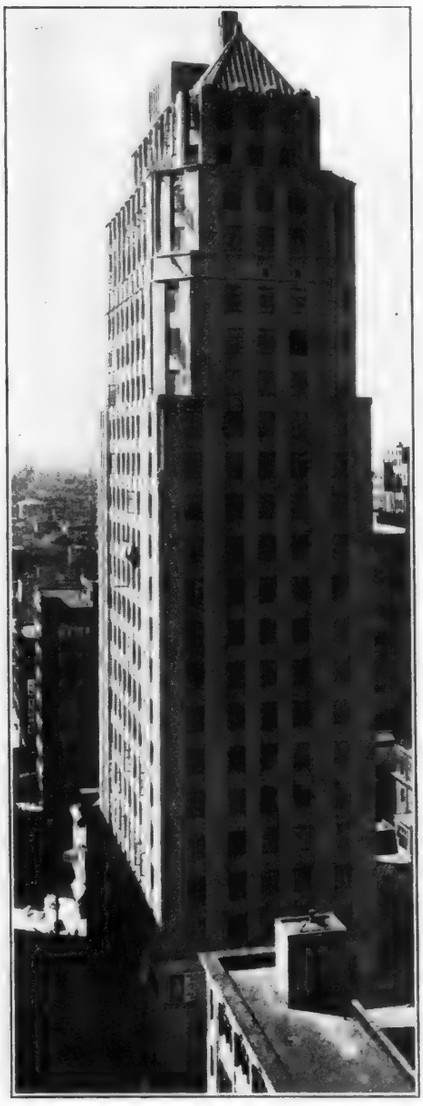
The Titusville Iron Works Co.
Titusville, Penna.

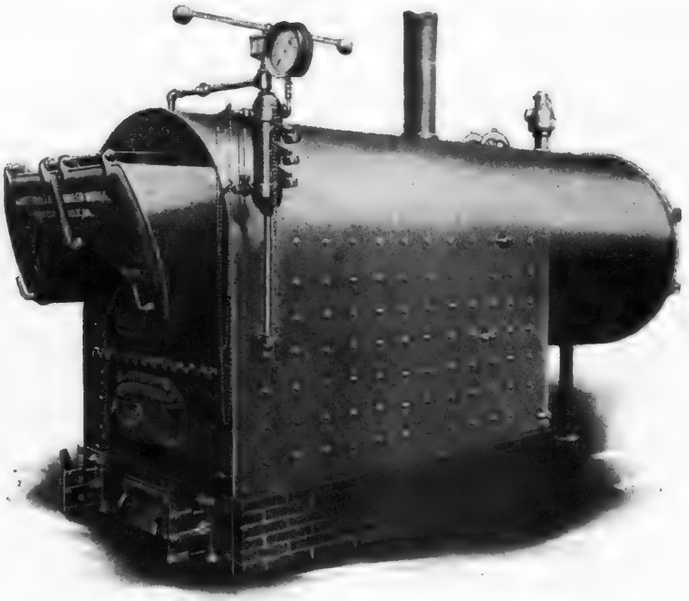
Sales Offices

New York
Detroit, Mich.
St. Louis, Mo.
Buffalo, N. Y.
Cleveland, Ohio
Pittsburgh, Pa.
Washington, D. C.
Chicago, Ill.
Los Angeles, Calif.
Charlotte, N. C.

Fuller-Luce Building-"Lincoln Service"
Two T-115 Tico Boilers

Another Prominent Office Building uses 2 COATESVILLE H.R.T Boilers





A Coatesville All Steel Portable Firebox H. R. T. Boiler

Number 1500 Walnut St., one of the newest and most modern Office Buildings in Philadelphia, has had its heating requirements adequately provided for, by two Coatesville Boilers. They are oil fired by S. T. Johnson Oil Burners.

The Architects were Ritter & Shay; General Contractors Thompson-Starrett, and the Heating Contractors V. N. Welamb Co.,—all of Philadelphia.

This is one of a number of important structures for which Coatesville Boilers have been recently chosen.

NOTE: We have just issued a new Series of Heating Boiler Bulletins,—tell us your requirements and we'll send the proper Bulletin.

COATESVILLE BOILER WORKS

Boilers - Tanks - Steel Plate Work

PHILADELPHIA 111 S. 15th St. | PITTSBURGH Union Trust Bldg. | NEW YORK 30 Church St. | BALTIMORE Lexington Bldg. | SAN FRANCISCO 945 Pine St. | BOSTON 141 Milk St. | NEWARK 60 Park Place

Coatesville All Steel Heating Boilers are also sold by

NATIONAL RADIATOR CORPORATION

Ten plants devoted to National Service through these Branch Offices and Warehouses:

Baltimore, Md.—2622 Frisby Street | Boston, Mass.—93-97 Oliver Street | Milwaukee, Wis.—124-130 Jefferson St. | New York, N. Y.—55 W. 42nd St.
Buffalo, N. Y.—259-265 Delaware Avenue | Louisville, Ky.—1126 W. Breckenridge St.
Chicago, Ill.—2445 N. Keeler Avenue | Cleveland, Ohio—935 E. 63rd Street | Omaha, Neb.—108-112 S. Tenth St. | Philadelphia, Pa.—121 N. Broad St.
Cincinnati, Ohio—Spring Grove and Elmira Avenue | Pittsburgh, Pa.—1509 Arrott Building
Indianapolis, Ind.—431 W. Georgia Street | Johnstown, Pa.—221 Central Ave. | Richmond, Va.—3032 Norfolk St. | St. Louis, Mo.—1042 Central Industrial St.
Washington, D. C.—2205 Fifth Street, N. E.

Effective outside.... efficient inside!

The new "Richmond Model" boiler combines the unsurpassed features of the original "Model" with the beauty of modern design

A FRONT feed boiler that incorporates the exclusive features that made the Richmond "Model" side feed an acknowledged leader. ¶ Low water line; built in vertical sections which are insulated with asbestos millboard; maximum of direct fire surface, and a free flue travel. These are a few of the outstanding features of this new boiler. ¶ A modern boiler in appearance. The straight lines of its design and the finish of dull black and gold are unequalled for dignified attractiveness. ¶ This new boiler is made in three popular sizes—15″, 22″, and 36″ grate widths. Data on construction, ratings, etc. is now in published form.

RICHMOND RADIATOR COMPANY

INCORPORATED

1480 BROADWAY, NEW YORK

Gas Boiler Division, 2220 Chestnut St., Philadelphia, Pa.

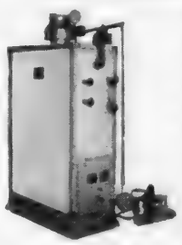
Branch Offices: Chicago Philadelphia Boston Cleveland

Factories | Heatomat—Enameled Ware—Radiators . . UNIONTOWN, PA.
Steam and Hot Water Boilers . . . . . NORWICH, CONN.

The RICHMOND name is a guarantee of finest quality

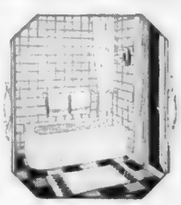
The slightest construction detail, the smallest metal part, must pass the most rigid inspection before it becomes a part of any product bearing the name "Richmond".

RICHMOND HEATOMAT GAS BOILER



The design, safety of operation and efficiency of the Heatomat Gas Boiler is fully approved by the A. G. A. Designed for use in homes, apartment houses, and commercial buildings. A labor-saving, cost-saving equipment which is extremely profitable for dealers. Write for the facts.

RICHMOND ENAMELED WARE



First quality only—no seconds. The complete line includes Sinks, Wall and Pedestal Lavatories, Corner Recess and Roll Rim Baths, Combination Sinks and Laundry Trays. Send for complete catalog.

RICHMOND RADIATORS

In beauty of design the Richmond Radiator is second to none. In efficiency it is unsurpassed. The U. S. Bureau of Standards recently tested certain Richmond Radiators and their ratings exceeded ours by as much as 8½%. There is 5% to 10% greater value in Richmond radiation. Let us tell you why.

RICHMOND RADIATOR COMPANY
1480 Broadway, New York

You may send me catalogs and details of the items checked.

.....Steam & Hot Water Boiler .....Radiators
.....Heatomat Gas Boiler .....Enameled Ware

Name.....

Address.....

H. V. 10

EQUITABLE TRUST COMPANY BUILDING
NEW YORK CITY
Architects: Trowbridge & Livingston, New York City
Engineers: Meyer, Strong & Jones, New York City
Plumbing Contractors: W. G. Cornell Company, New York City
Heating and General Contractors:
Thompson-Starrett Company, New York City

NATIONAL

AT THE WORLD'S FINANCIAL CENTER

Across the street from where the first President of the United States took oath of office, and on one of the most valuable pieces of land in the world, a new and magnificent structure now towers far into the air.

Within the shadow of its casting are the world's most famous financial headquarters. Here will stand another landmark created by master minds of the architectural and engineering professions—emphasizing modern beauty and efficient design.

Responsibility for such structures rests heavily. Every selection of materials will challenge the wisdom of their sponsors as time determines their service quality, adequacy and durability. Many miles, many tons, of "NATIONAL" Pipe have now become an integral part of this building. The reputation for general dependability, consistently appearing throughout tubular history from the earliest days of pipe making, gives every promise that this piping bears the same ratio to successful performance as the building itself.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

District Sales Offices in The Larger Cities

FOR OIL BURNING

All heating surface, being in the combustion chamber, is reached directly by the radiant heat of the fire and is tremendously effective as compared with indirect or flue surface. The large combustion chamber insures an almost perfect ignition of gases.

COIL

Steel Heating Boilers and Water Heaters

When you sell a man a Coil Oil Burning Boiler, you have given him something more than "just a boiler." You give him also positive service for many years to come and you give him a super-efficient heating plant that will operate at the minimum of cost. We have letters from hundreds of Coil users who have been glad to write us and tell us of the remarkable service they have had from the Coil Oil Burning Boilers they are using.

Write for details of the Coil line of Steel Heating Boilers and Water Heaters.

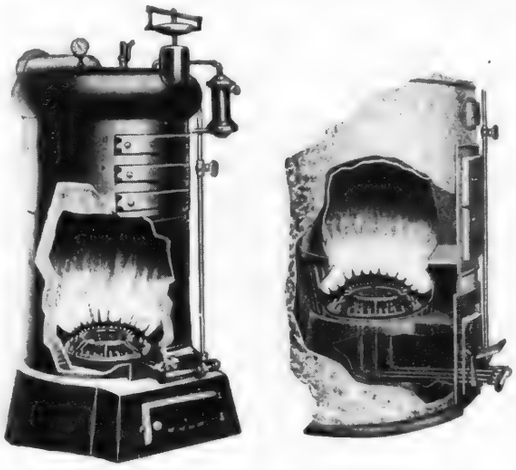
MONITOR BOILER COMPANY

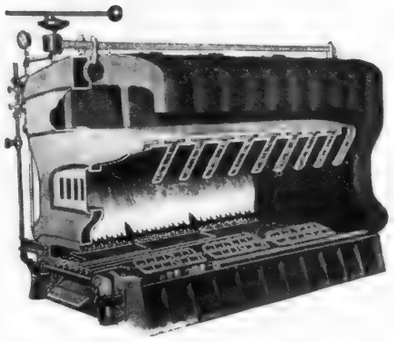
1505 RACE ST., PHILADELPHIA, PA.

Conversion Work is Done Better with

BARBER Patented JET GAS BURNERS

There are many good reasons why you should standardize Barber Burners for conversion work. The principle of combustion utilized in Barber Burners is the outstanding improvement in gas burner design during the last half century. Barber Burners are based upon a scientifically correct principle that develops the highest efficiency of any gas burner operating on atmospheric pressure. Impartial and authoritative tests prove Barber Burners are from 15% to 35% more efficient than mixer types of gas burners.





Barber Burners are furnished in a great variety of designs, sizes and capacities, which renders them exceedingly flexible in their application to the exact requirements of any type of heating device. The correct Barber Burner assembly properly installed, guarantees the user the utmost satisfactory service. Equipped with a gas Pressure Regulator and Temperature Control, the installation is automatic in its operation.

On Barber Burners the air and gas adjustment is fixed and automatic in its operation. A premixture of air and gas takes place in the jet tubes, and auxiliary primary air is introduced above the jet tubes where the two flames meet. As the premixture of air and gas leaves each pair of jets, there is an attempt to create a vacuum at the point of confluence of the two flames. At the same time, there is a constant attempt on the part of nature to break up the vacuum, with the result that there is always drawn into the flames exactly the amount of additional primary air required to insure perfect combustion.

Barber Burners are equally efficient on Natural, Artificial or Mixed Gas; develop a flame temperature of at least 1960° F. on normal gas pressure; most economical in gas consumption; dependable on all kinds of gas conditions; no adjustable parts; nothing to break or get out of order; no gauzes to clog or burn out; safely act as their own pilot—and can not be made to back-fire.

Correctly specified and properly installed they are free from service troubles. More than a million Barber Burners are rendering the users the utmost satisfactory service. They will render you and your customers the same high degree of satisfaction.

You are cordially invited to visit our booth at the American Gas Association Exhibition in Atlantic City—October 8th to 12th.

COMPANY MEMBER OF AMERICAN GAS ASSOCIATION INCORPORATED 1918

The CLEVELAND GAS BURNER & APPLIANCE CO.

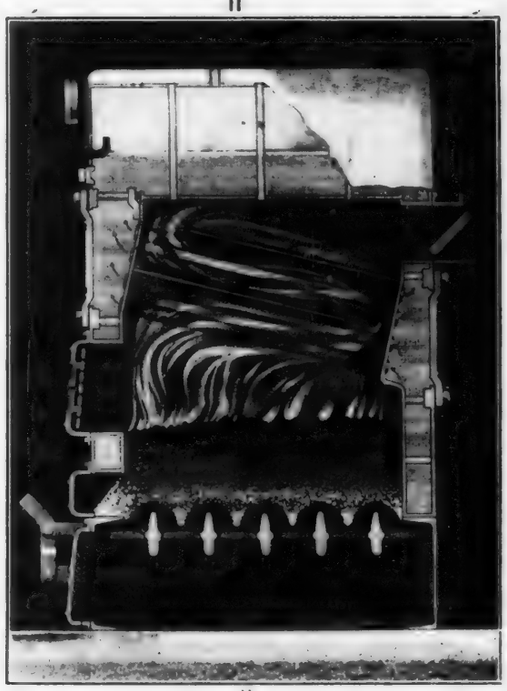
Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio

SUPPORTING MEMBER

KNOWLTON WATERTOOB STEEL BOILERS

Use Coal in Knowlton "Watertoob" Boilers



Then you will have complete satisfaction in—economy—rapidity of heating—attention. The "Copper" water tube construction does it.

Write for booklet "Complete Heating Satisfaction" which tells the rest of the KNOWLTON *Story.*

ORR & SEMBOWER, Inc.

Reading, Pennsylvania

(Established 1885)

208 N. Clinton St., CHICAGO 50 Church St., NEW YORK

The BETTER BUCKWHEAT BURNER

Are You Interested In DOUBLE Boiler Protection?

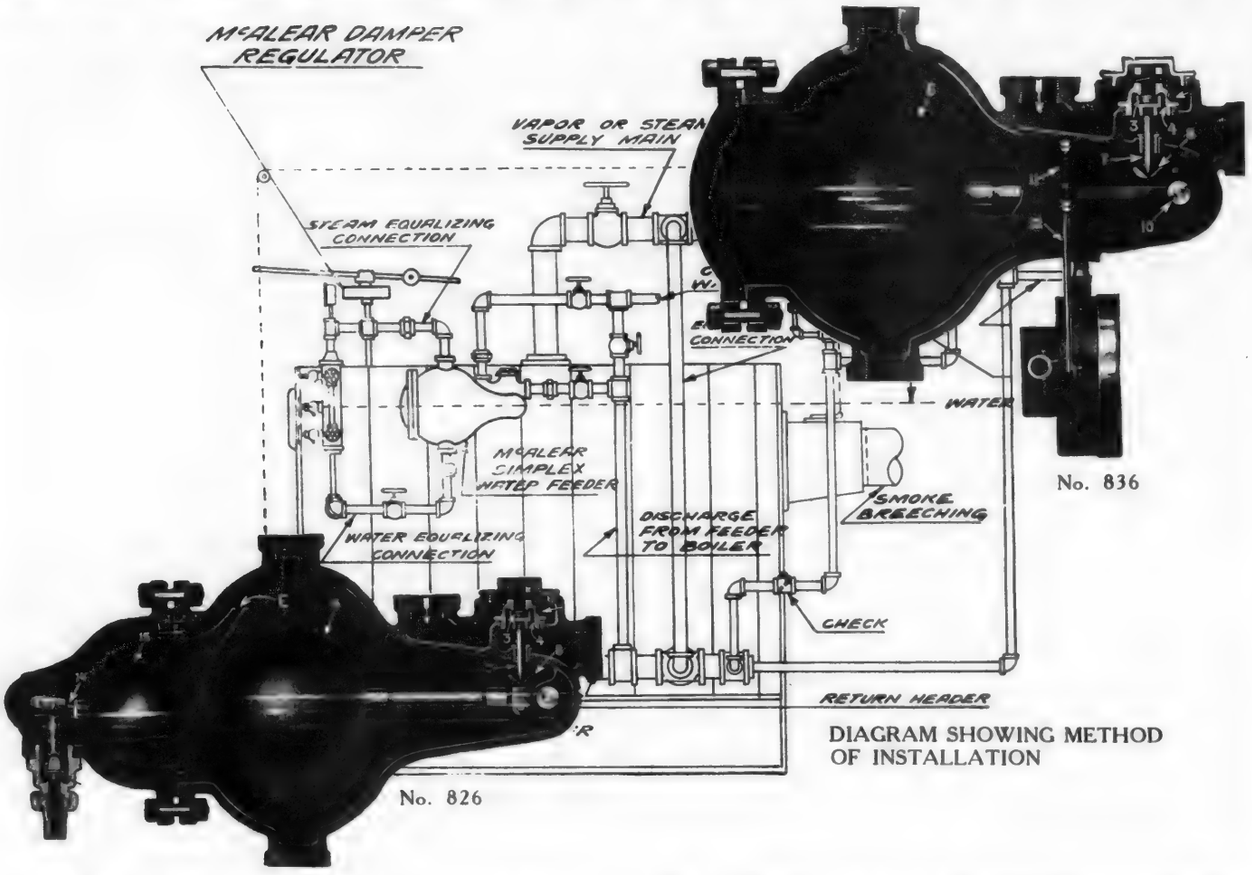


DIAGRAM SHOWING METHOD OF INSTALLATION

THERE are two ways of protecting boilers from burning out. One is by keeping an ample supply of water in the boiler as shown by No. 826 Duplex Feeder. The other directly concerns oil-fired boilers, and it is to extinguish the fire in case of low water, before damage is done as shown by No. 836.

A water feeder that performs one of these methods will protect your boiler, but now there is available a device that gives double protection by performing both services. It is the McAlear Combination Water Feeder and Low Water Electric cut-out, No. 836.

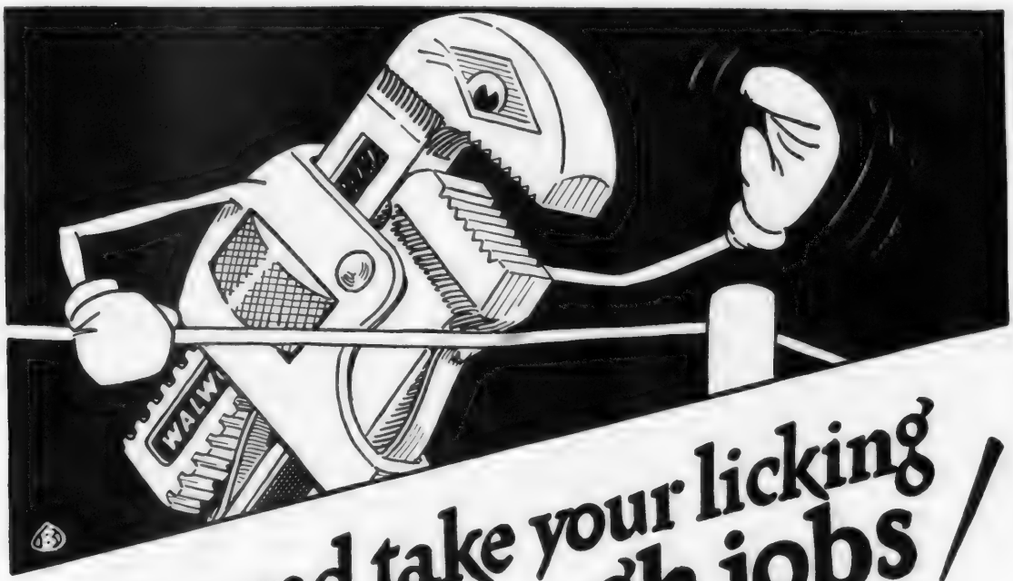
No. 836 Water Feeder is especially designed for use in connection with low pressure oil burning installations. It not only controls automatically the make-up water necessary to maintain a constant water level in the boiler, but in addition, breaks the electric circuit operating the oil burner pump should the water level in the boiler for any reason reach the danger point.

If you want your boiler absolutely protected against fracture, install a McAlear Water Feeder. Operates with equal success on oil, gas and coal-fired boilers.

Bulletin "K-2" tells the complete story of McAlear Water Feeders. Write for a copy.

THE McALEAR MFG. CO.

1901-7 South Western Avenue, Chicago, Ill.



Come and take your licking — you tough jobs!

50% stronger than ever before

The man who tackles any pipe job with a new Walworth Master Stillson has enough brute strength in his two hands to break the tightest joint that ever stuck. Jobs that make other wrenches curl up and quit are easy pickings for the tougher jaw, the stronger tooth, and the tremendous leverage of this new Stillson.

You can put more than 1200 pounds of turning strain on the red handle of a 14-inch Master Stillson and never even bend it. (But be careful how you try the same stunt with some other kind of wrench.)

WALWORTH

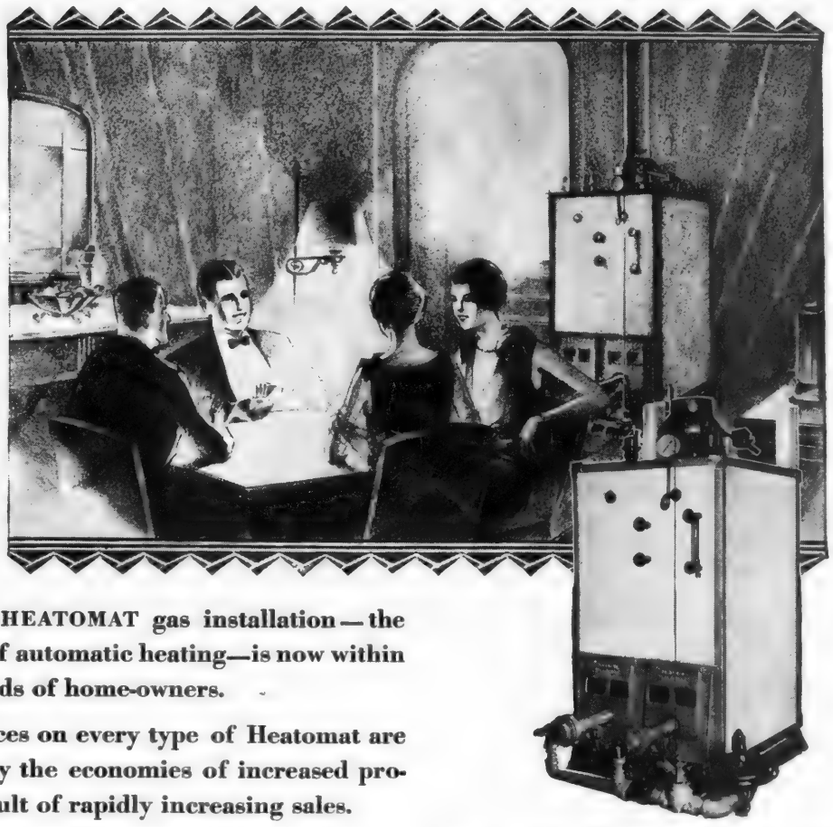
Walworth Company, General Sales Offices: 51 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa., and Attalla, Ala.

Distributors in Principal Cities of the World

Walworth International Co., 11 Broadway, New York, Foreign Representative.
Walworth Company, Limited, 10 Cathcart Street, Montreal, P. Q.

MASTER TRADE MARK STILLSON REGISTERED U.S. PAT. OFF. **STILLSON**

New reduced prices widen the market for RICHMOND HEATOMAT GAS BOILER



"Light in the fall —that's all"

A RICHMOND HEATOMAT gas installation—the ideal form of automatic heating—is now within reach of thousands of home-owners.

New lower prices on every type of Heatomat are made possible by the economies of increased production—the result of rapidly increasing sales.

Our tested cooperative sales plan makes it easy to interest prospects and closes sales. There is a handsome profit to be made on the Heatomat. Get the facts.

Richmond Heatomat Gas Boilers are being installed in a large percentage of all new building operations and open up practically an unlimited new field of business in replacing old coal boiler installations with this most modern of heating plants. All that a Heatomat requires is to light in the Fall—That's All. It is entirely automatic and fool-proof.

The complete line of Richmond Heatomat Gas Boilers for hot water, steam and vapor systems, equipped with complete operating controls, is approved by the American Gas Association, for efficiency and safety of operation.

Write for full details of the Richmond Heatomat, our new price sheet and our helpful cooperative sales plan. Richmond Radiator Company, Inc., Office of Gas Products Division, 2220 Chestnut Street, Philadelphia, Pa. Factory, Uniontown, Pa.

General Executive Offices:
1480 Broadway
New York, N. Y.

Richmond Radiator Company, Inc.
Gas Products Division
2220 Chestnut St., Philadelphia, Pa.

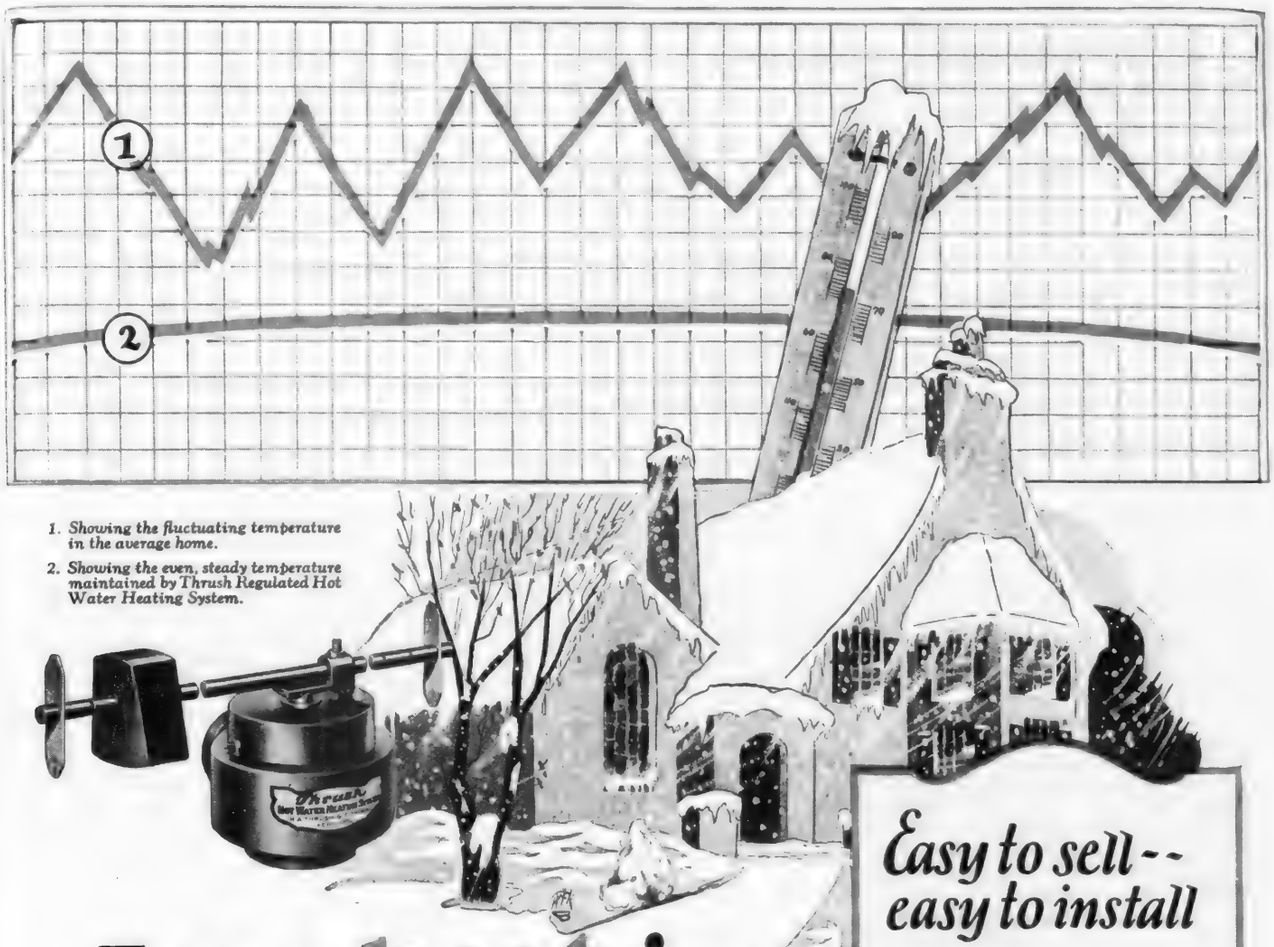
You may send me New Price List, catalogs, and details of the Richmond Heatomat Gas Boiler.

*Name*_____

*Address*_____

*City & State*_____ H. V. 10

Branch Offices:
Philadelphia
Boston Chicago
Cleveland



1. *Showing the fluctuating temperature in the average home.*
2. *Showing the even, steady temperature maintained by Thrush Regulated Hot Water Heating System.*

Even heat in *any weather!*

YOUR customers want healthful heating. That means mild, even temperatures faithfully maintained throughout the day and night. You can give them that kind of heating with Hot Water, Thrush Equipped, and at the same time cut their fuel bills from 30% to 50%. Hot Water Heating is mild and flexible and the Thrush Regulator keeps it constantly controlled. Thrush System also puts the plant under pressure, increasing heat transmission, speeding circulation and reducing fuel consumption. You can put it on old or new plants—the cost is very slight. It is a splendid feature with which to build business and put individuality in your work. Ask your jobber.

Easy to sell -- easy to install

THRUSH System should be sold to the home owner because of *what it will do for him.* Every home owner wants better heating with prolonged firing periods and reduced fuel consumption. They will buy Thrush System because it will positively accomplish those results e onomically.

Your own work is made easier be cause all of the equipment goes in the basement close to the boiler. It requires only six feet of pipe and seven fittings to install. Best of all, reduced pipe sizes completely offset the cost of Thrush Equipment.

The Thrush System is absolutely safe. You can install it with assurance.

mail us this!

H. A. Thrush & Co.
Peru, Indiana

Please send me your illustrated catalog of Thrush Equipment at once.

*Name*_____

*Address*_____

THRUSH SYSTEM
OF HOT WATER HEATING

DUNHAM HEATING

An open letter from the president of C. A. Dunham Co.

OUR National business has become International. Under corporate powers vested in several companies, the latest of these is the C. A. DUNHAM COMPANY, LTD., of London, England.

There are at present more than eighty offices in the United States, Canada and Great Britain, and in addition thereto, there are several agencies in other parts of the World. This forms an active background for the Dunham Differential Vacuum Heating System.

An Organization of Specialists

In each office there are from one to ten members—one or more of whom have engineering training, qualifying them to advise on the proper application of this new heating method.

Certain well defined territory boundaries surround each company office, and all installations are the fixed responsibility of the managing engineer in whose territory these systems may be located.

Such local tie-ups between the company's organization and the Architect's engineer to design the heating, and subsequently with the heating contractor in the installation, is insurance of satisfaction to the owner.

This is a brief picture of the merchandizing end of the Dunham organization.

It represents the contact point thru which our message of helpful service is demonstrated;—only on its proper functioning, can the years of rich experience be turned into channels of everlasting profit to the recipient of Better Heating. The reputation and the combined intelligence of the men who are back of this work cannot be questioned; each has a sustaining conviction of his responsibility in helping to make this system possible for a general use.

Its Value Has Been Proved

There is no mistake about the value of heating buildings with low temperature steam which may be varied to meet the needed output to balance the heat loss. Mr. Apple, Superintendent of the Barlum Tower, Detroit, states that the season's cost of heating that forty-story building with this system, was $0.292 per square foot of radiation. The season started September 12, 1927, and ended June 5, 1928; it was a green building and had all the usual handicaps of foreign matter to clear, which invariably attends the first year of any installation. Steam costs were $1.00 per 1000 pounds.

Our own building heating costs dropped from $0.199 the first season, to $0.169 the second season's operation per square foot of radiation, and in each case this record was for the entire period between October 1st and May 31st using oil as the fuel.

Chicago apartment buildings show greater savings the second season than for the first, with a radiation operating cost per square foot as low as $0.212 for the full heating period just passed using coal as fuel.

We have records on file of installations in and between Quebec, Canada, and Dallas, Texas; between Rhode Island and Oregon, each reflecting variables in fuel conditions and weather changes. Reports from every installation which was in operation during any portion of the winter, have been uniformly satisfactory and with fuel saving established beyond our most sanguine expectations.

A Most Important Development

Our own engineers, who have been so closely identified with me in this development, admittedly agree that for useful results wherever artificial heat is needed, this system numbers with the most important developments of the present day.

A mere statement that the Differential System properly installed and operated can accomplish the remarkable fuel saving claims, sounds bombastic without the evidence, but it is true—we have the evidence and the proof that the Dunham Differential System will save 25% (or more) of fuel over the standard vacuum return line system in general use today.

C. A. Dunham

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

C. A. DUNHAM CO.
450 EAST OHIO STREET

Dunham Building
CHICAGO, ILLINOIS

On almost any heating job, one of these

GAS BOILERS

is cleaner, more convenient and more profitable

to you!

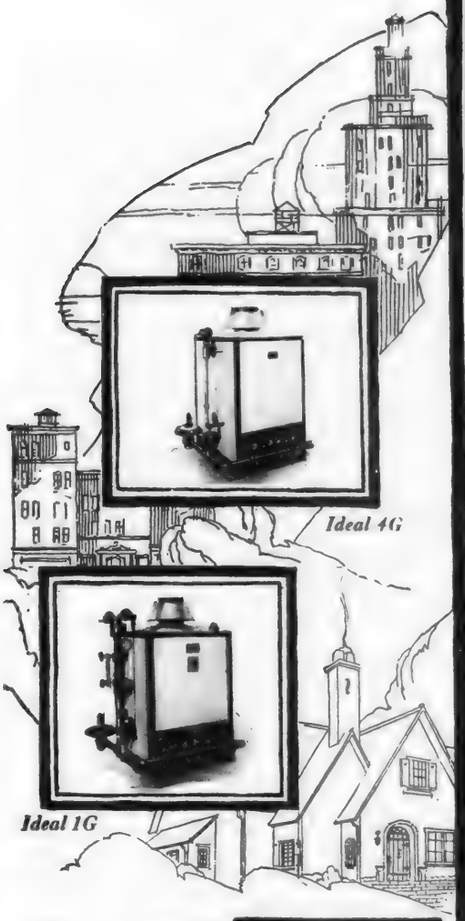
For cottages or bungalows — with or without basements — an Ideal Arcola Gas Heater!

For small or medium-sized homes —Ideal 1G Gas Boiler!

For larger homes and buildings — Ideal 4G Gas Boiler!

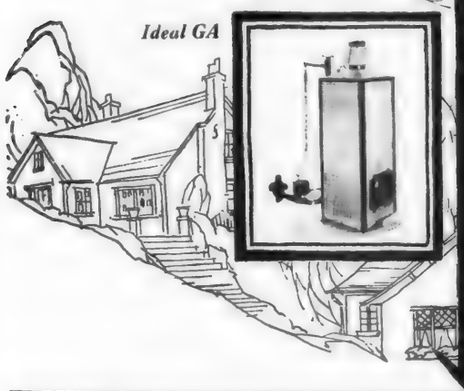
For office buildings, big apartment houses, hotels — Ideal 4G Gas Boilers in multiple units

All these boilers are useful for large-volume hot-water supply and industrial applications.



Ideal 4G

Ideal 1G



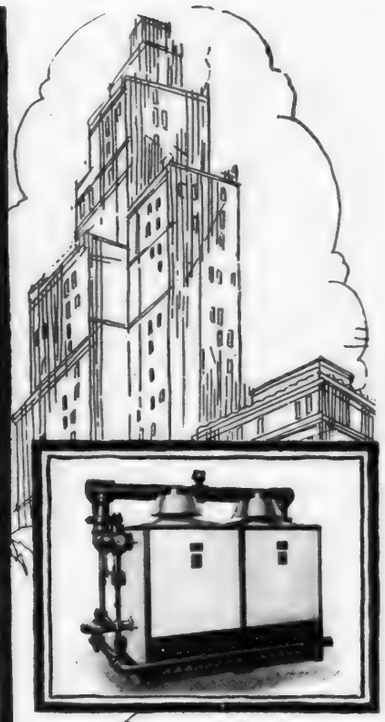
Ideal GA

LET your better customers know what it means to live in a house automatically heated by an Ideal Gas Boiler!

More and more gas companies are establishing special rates for heating, and cooperating with contractors. This means a clean net profit for you on every job. The gas company takes care of callbacks and service.

A complete range of boilers for every heating job—from a model cottage to the largest building.

Write for details



Ideal 4G

IDEAL GAS BOILERS

Product of AMERICAN RADIATOR COMPANY *Gas Utilization Dept.*

Write to AMERICAN GAS PRODUCTS CORPORATION, *Distributors*

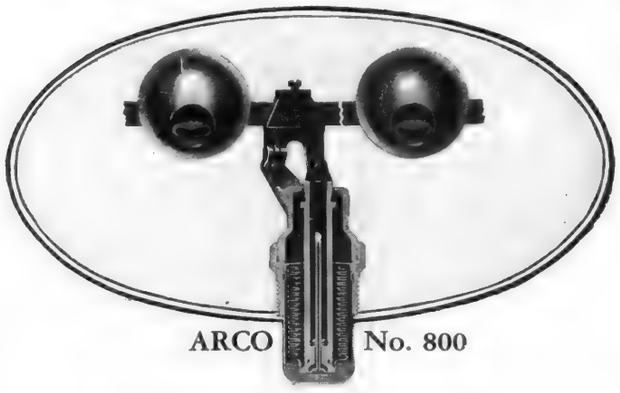
376 Lafayette Street, New York City

ARCO REGULATORS

PRESENT

four new ways to

EXTRA PROFITS



Arco Water Regulator No. 800

When you are called in a home on repair work, notice if the boiler is equipped with a water regulator. If not, sell the owner the added convenience of an Arco No. 800. It means an end to everlastingly chasing up and down the stairs adjusting drafts, and a noticeable saving in fuel bills because it maintains an even temperature.

Arco Steam Regulator No. 905

If you are called in to replace a wornout rubber diaphragm in a steam regulator sell an Arco No. 905 instead. The sale will be easy. Simply tell the owner that the diaphragm of the No. 905 is metal and never needs to be replaced. Everyone will quickly see such genuine economy.

Arco Junior Regulator No. 801

This modern device minimizes lime deposits because it automatically keeps the temperature below the precipitation point. Sell it for every tank heater. It keeps an ample supply of hot water that is never too hot and eliminates the tedious task of rekindling fires burned out by runaway drafts.

Arco Tank Regulator No. 825

Sell this regulator for all public buildings that require a constant hot water supply. It automatically maintains a plentiful supply of hot water at just the right temperature regardless of how much or how little is used. The saving in steam and expense of repacking fixtures damaged by over-heated water will soon pay for this regulator.

• • • •

THE modern home owners demand automatic equipment. They quickly recognize the economy in any device that saves steps, labor, or dollars. For this reason, the American Radiator Company, as well as other leading manufacturers, are today equipping their boilers with automatic damper controls. There is no more convincing evidence that automatic regulators are an essential part of modern heating equipment.

This will undoubtedly suggest to you a way to unlimited extra profits, for surely in your vicinity there are many sales opportunities for this complete line of automatic regulators. When you talk added convenience and economy, sales are certain.

AMERICAN RADIATOR COMPANY

ACCESSORIES DIVISION WR-710

40 WEST 40th STREET NEW YORK, N. Y.

Why ..... only the best duplex feeder is good enough...

A HEATING CONTRACTOR told us recently that he considered it possible to have McDonnell & Miller protection without paying the McDonnell & Miller price. He didn't question the superiority of the new self-cleaning feeder, but he asserted that the feeder was better than is necessary for "ordinary" operation.

Our answer is that just as long as the boiler water line depends on human memory any emergency is likely to arise . . . sometime. It follows that unless a duplex feeder is equal to *any* emergency, it is *worse than none.*

You pay a little more for the new self-cleaning McDonnell & Miller, but your dollars buy *continuous* feeder service—nothing less is worth buying.

To overcome the effects of rank feed water it was necessary to design valves that clean and grind themselves during every movement of the float. To provide capacity sufficient to supply the entire feed-water requirements of boilers of any size, even though the condensation pump ceased to operate, it was necessary to work out a method of putting the full city pressure into the boiler feed line.

And finally, to make the feeder easy to install and to adjust, it was necessary to provide a method of changing the water line one inch higher or lower *after* the installation is made and also for adjusting the differential between supply and overflow valves.

Such a feeder is *worthy* of your confidence—a fact that has been written into the records of every boiler room in which the new feeder has been installed.

Booklet brings facts and data

Simply mail the coupon for an interesting booklet which contains facts that every engineer and heating contractor should have.

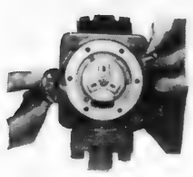
McDonnell & Miller, 710 Wrigley Bldg., Chicago

McDONNELL & MILLER

SELF-CLEANING

Duplex Feeder

"Doing one thing well"



The valves that stay new

The rotary valve, shown above, cleans and grinds its surfaces each time the float moves. The valve disc can be easily removed from the shaft and changed to any of the three positions indicated by the numerals. The three positions of the feed-water supply valve provide for changing the water line an inch up or down after the feeder is installed. By changing the relation between the overflow and supply valves, the differential may be set at 1, 2, 3, 4 and 5 inches.

A large accessible strainer

To make the feeder still more positive, a large solderless strainer is provided which can be quickly and conveniently removed as shown opposite.

YES I WANT THE NEW BOOKLET

Firm_____

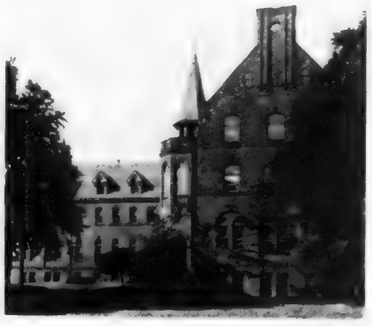
Individual_____

Street and Number_____

City and State_____

Mail to McDonnell & Miller, 710 Wrigley Bldg., Chicago H.V. 10

Group Heating by Barnes & Jones



School at St. Michael's

ST. MICHAEL'S CATHEDRAL
Springfield, Mass.
Engineer—Wm. P. Brown
Htg. Contractor—J. J. Cotter Co.

GROUP OF FIVE BUILDINGS
Heated by the B. & J. System
Five others not shown here also heated by Barnes & Jones

School at St. Michael's

St. Michael's Rectory

St. Michael's Convent

A GROUP of ten buildings at St. Michael's Cathedral, Springfield, Mass., is heated from a central heating plant with complete satisfaction by a Barnes & Jones Vapor System. The buildings are of varying types. The group includes a Bishop's residence, rectory, parish house, two school buildings, convent, chancery, another residence, the heating plant itself and the Cathedral. This notable group installation presents another excellent example of the applicability of Barnes & Jones Heating Systems to any and all types of heating.

Barnes & Jones

Modulation Vapor and Vacuum Heating Systems of Proven Quality

128 Brookside Ave.
Jamaica Plain, Boston

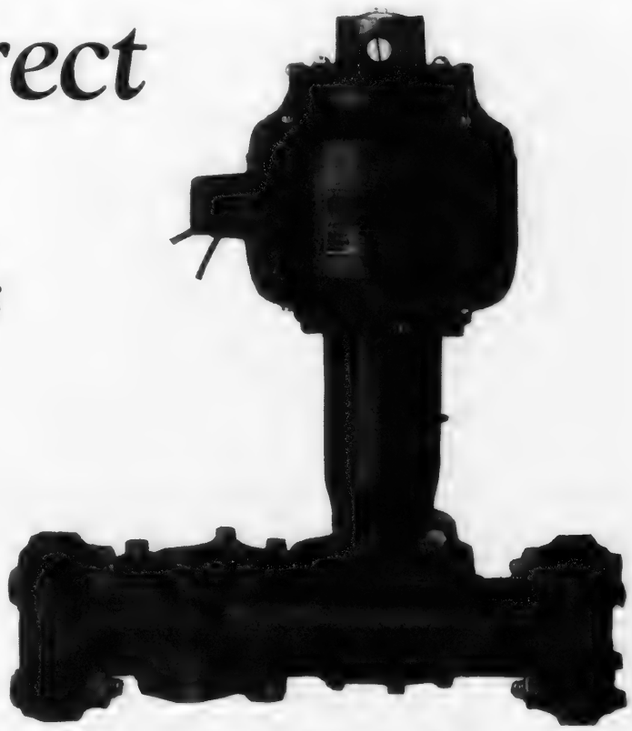
The Sign of B&J *Satisfaction*

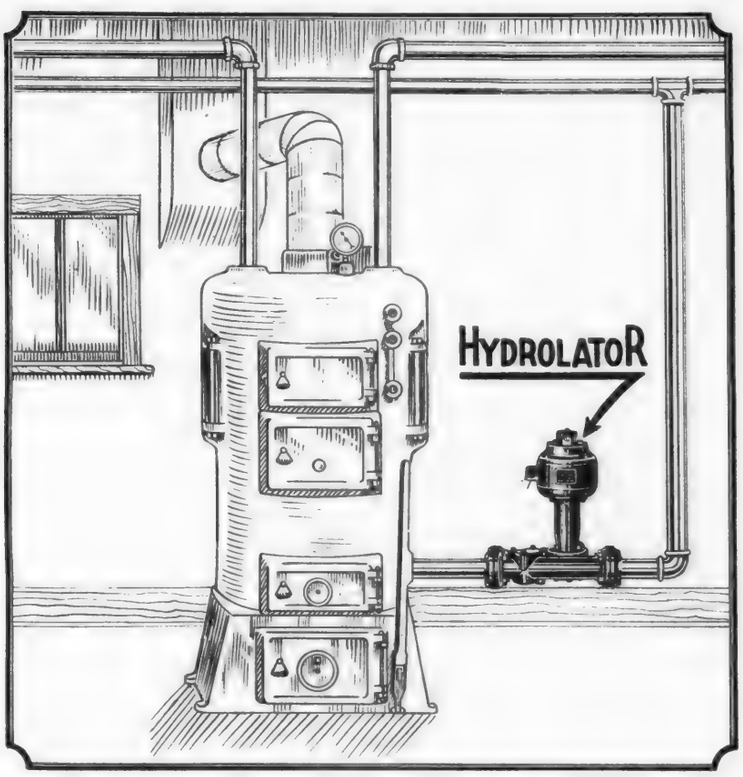
101 Park Avenue
New York City

How to Correct Hot Water Circulation Troubles

Make more money on every NEW JOB and use this sure way of correcting trouble on installations already in.

Any hot water system will work more efficiently if the HYDROLATOR is installed in the line. This device is perfect from an engineering standpoint, and through a motor-driven pump circulates the water mechanically. Wherever you have difficulty in securing rapid and uniform hot water circulation, the HYDROLATOR will correct this difficulty. There is no doubt about it.





The HydrolatoR

Stimulates circulation by means of a motor-driven rotary pump; intermittent operation, manual or automatic control. Requires little attention and always does the job. The HYDROLATOR is practically noiseless and improves circulation on any system.

Saves fuel.
Eliminates traps and short-circuit.
Forces water to all radiators.
Insures constant supply of hot water.
Does not interfere with normal flow.
Increases customer's satisfaction.

Wherever the HYDROLATOR has been installed, either on industrial systems or in private homes, it has increased the satisfaction over the job. It makes friends for the installer, for it makes any hot water system more efficient. Use the HYDROLATOR whenever you install a hot water heating system, or a service supply system, to get better results.

Write to us for complete information of installations where money has been saved for the customer and more money made for the installer.

Free Engineering Advice

Our Engineering Department is ready to help you with any problem you may have. Write us for free questionnaire, on which you can explain the trouble you are having, or explain this in a letter. Let us help you to solve it. There is no charge.

Janette Manufacturing Company
556-558 West Monroe Street
Chicago

Singer Bldg.
149 Broadway
NEW YORK

Real Estate
Trust Bldg.
PHILADELPHIA

JANETTE MFG. CO.
Department H 178
556-58 West Monroe St., Chicago, Ill.
Please send me without any obligation full details of the HydrolatoR, and tell me how I can make more money and have more satisfied customers by installing it.

Name .....
Address .....
City ..... State .....

Sectional View
No. 6 Multiflex Trap
Exterior View
No. 6 Multiflex Trap
Sectional View
Modulation Valve
The regulation is self indicated on the dial; less than one full turn of the handle opens full from shut to full opening
ON
Top View
Modulation Valve

An Ideal Combination

The Bishop & Babcock bellows type radiator trap and bellows inlet valve are made with all interchangeable parts and are insured an indefinite life by the use of seamless Multiflex bellows, manufactured in our own plant. Both are tried and proven articles, and behind them is the experience of many years of one of the largest companies engaged in this line of business.

These valves are typical of the thoroughness with which we have engineered our line for many years in the direction of both simplicity and efficiency.

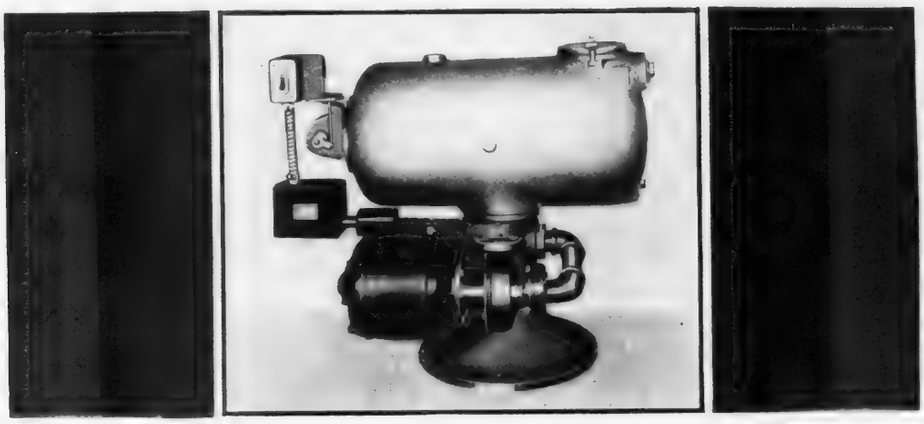
The Bishop & Babcock Line comprises Vacuum and Vapor low pressure Heating Specialties; a complete system of Automatic Temperature and Humidity Control; Massachusetts Squirrel Cage Fans, Air Washers and Unit Heaters.

Architects and Engineers who standardize on Bishop & Babcock Apparatus insure uniformity in design and operation not to be found in equipment of varied manufacture.

THE BISHOP & BABCOCK SALES CO.
General Offices 4901-4915 Hamilton Ave., N.E.
CLEVELAND, OHIO
Branches and Representatives in Principal Cities

BISHOP & BABCOCK
TEMPERATURE REGULATION
HEATING SPECIALTIES VENTILATING EQUIPMENT

New Trane Condensation Pump Develops Amazing Capacity



Assembled on one base and wired for installation

This new model establishes new standards in centrifugal pumps. ¾ H. P. motors do work that has required one or 1½ H. P. in the past. On the larger pumps, 7½ H. P. motors do work that has required ten. The new design is remarkably compact and light in weight, yet sturdy in construction. Capacities are higher, operation costs are reduced. And prices are still low.

This is the simple pump outfit you have been waiting for. The pump, motor, receiver, switch box, and motor protective equipment are mounted as a single unit on one base. The contractor has nothing extra to buy. A one-man job of installation. Hook up the feed wires, make two simple pipe connections, and the pump is ready to operate.

The same new features of construction are embodied in pumps for boiler feed, booster, circulating, and general service. Write for new bulletin containing complete information.

THE TRANE CO. (Est. 1885)
206 Cameron Ave. La Crosse, Wis.

BOILER FEED
CONDENSATION

TRANE
PUMPS

CIRCULATING
BOOSTER

Thousands of Satisfied Users Can't *All* Be Wrong!

TORIDHEET
OIL BURNER
FOR BETTER HOME HEATING

Equipment is easily installed. Free from profit-stealing, time-wasting service calls. Listed as standard by the Underwriters' Laboratories. Approved by New York Board of Standards and Appeals and by Massachusetts Board of Public Safety.

A GOOD recommendation for any equipment is the user's opinion, "I'm satisfied."

If that opinion is repeated by thousands of users, as it is in the case of the TORIDHEET Burner, that's overwhelming evidence of the sterling qualities of the product.

Each installation of a TORIDHEET Burner means satisfaction for three people—the maker, the dealer and the user.

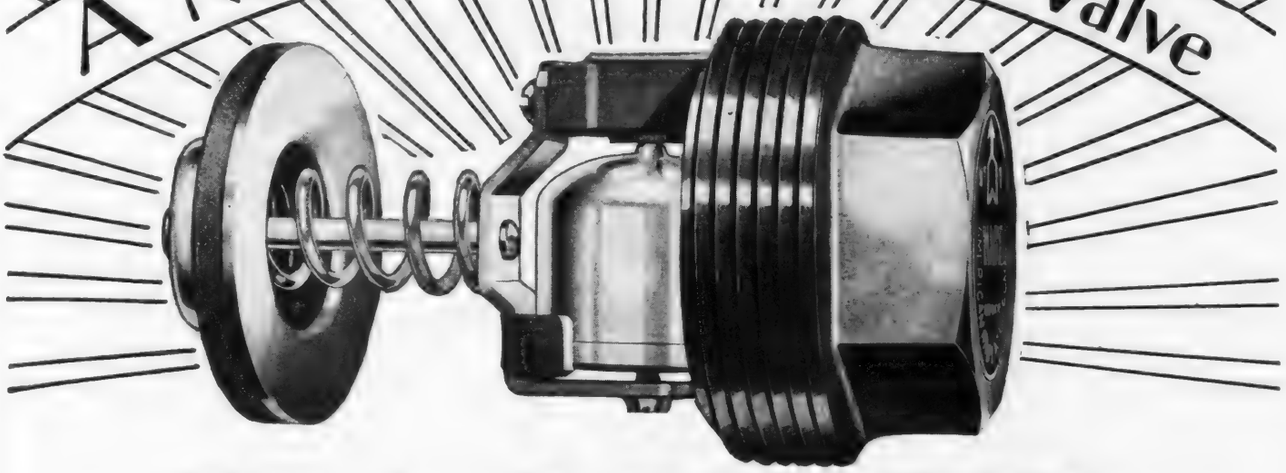
And *that* satisfaction is complete because TORIDHEET means plenty of comfortable heat, continuous dependable service, quiet operation and economical maintenance.

Moreover, it's absolutely automatic, thoroughly safe, surprisingly clean, and reasonable in price.

Especially is TORIDHEET attractive to dealers because it's easily installed and requires no excess service calls that eat up the original profit. The TORIDHEET Dealer's Franchise means a fine opportunity for profits. If you want most interesting data on these profits, write us promptly.

CLEVELAND STEEL PRODUCTS CORP.
Madison at West 74th Street · Cleveland, Ohio

A New Revolutionary Air Valve



IN-AIRID

The Invisible AIR VALVE

The Correct Solution of the Venting Problem

IF you do not know about this remarkable new air valve it will pay you to investigate at once. The new IN-AIRID, introduced only recently, has met with overwhelming approval, for it not only effects more complete venting but in addition makes possible the highly desirable feature of completely concealing the valve within the radiator.

As you know, when new type radiation is used on one pipe steam jobs, the steam has a tendency to short circuit through the top nipples and close the air valve before all the air has been driven from the radiator. This trapped air greatly reduces the heat output, often to such an extent that additional radiation is added, and needlessly, for the trouble is caused, not by insufficient heating surface, but by trapped air—incomplete venting.

The new IN-AIRID prevents this short circuiting for it screws into the top plug opening of the vent end of the radiator and its baffle disc completely blocks off the nipple opening of the last section. Thus, steam cannot come in contact with the valve float unless it travels up the last section and drives all the air out ahead.

The preventing of short circuiting is only one distinctive feature of IN-AIRID. There are many others:

Entirely invisible, thereby improving the appearance of the radiator.

Dry venting—IN-AIRID is in the driest part of the radiator, yet, should water reach it the float closes instantly.

Cannot "water-log"—no siphon necessary, because there is no shell to hold water.

Cannot be damaged because all working parts are within the section.

Cannot be stolen or turned upside down—preventing operation.

No hissing—no leaking of steam or water.

Will not clog with dirt because it is in the cleanest part of the radiator—yet when necessary can easily be cleaned if clogged under abnormal conditions.

All metal. Nothing to wear out.

Requires no adjustment and cannot be tampered with.

Easily installed.

Inexpensive.

Made and guaranteed by the world's largest manufacturer of heating equipment.

Order a trial dozen IN-AIRIDS today. A test will quickly demonstrate the superior features of this new valve.

Be prepared for the busy heating season close at hand. Order at once from your jobber or directly from us.

AMERICAN RADIATOR COMPANY

ACCESSORIES DIV. IAV710, 40 WEST 40th STREET, NEW YORK, N. Y.

now only $385 completely installed (Tank extra)

Hardinge has given competition a big jolt with the introduction of the new and improved *Hardinge Junior*—a specially designed oil burner for average home needs—selling completely installed for only $385—tank extra.

Dealers everywhere know that the precision-built Hardinge is the outstanding fuel-oil burner. Only its previous *high price* caused some few to carry a cheaper burner—thinking they could gain quantity sales with a cheaper product. But Hardinge sales have climbed higher and higher every year. And now with the Hardinge Junior selling for *only $385* and price reductions affecting every other model, dealers have found their Hardinge franchise doubly valuable. They are now selling what has been the most expensive oil burner on the market for the same price as an ordinary burner.

The Hardinge line includes a model for every heating requirement from bungalow to skyscraper, and at a range of price to fit every purse.

A few territories are still open. Write us for full facts about the ever-growing demand for Hardinge Fuel Oil Heat and its profit-making possibilities. Write today.

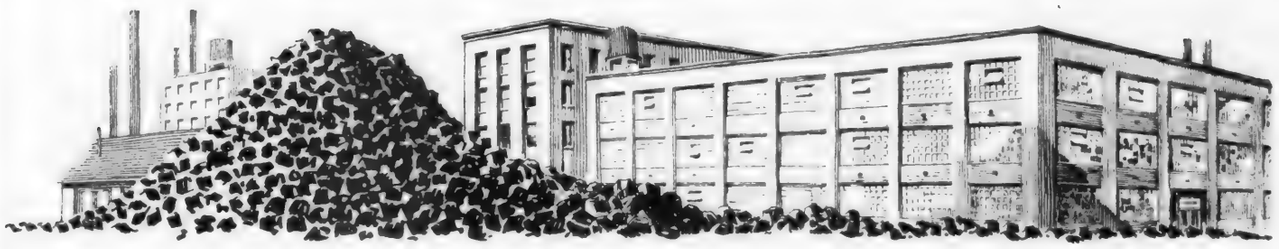
HARDINGE
FUEL OIL HEAT

HARDINGE BROTHERS, Inc.

Factory Branch
CHICAGO
Michigan Ave. at Ohio St.

Factory and General Offices:
4149 RAVENSWOOD AVENUE
CHICAGO, ILL.

Factory Branch
BOSTON
843 Beacon St.



$12,000 *for modernization saves* $17,300 *per year!*

AN extreme case? . . . Perhaps . . . But typical of the service progressive consulting engineers and contractors are rendering their clients through modernizing with Webster. Here are the facts on *this case,* taken from the findings of an independent engineering organization and verified by the mill's master mechanic.

A textile manufacturer was spending $270.00 per day for heat, power and process steam — using a high-pressure system with sections of several vintages.

At the suggestion of his consulting engineer, this system was converted into a modern Webster Vacuum System, using as much of the old equipment as was practicable, and making only such additions as were necessary to provide efficient circulation . . .

What happened? . . . Coal consumption was reduced from 45 to 31 tons per day . . . or, on a dollar-for-dollar basis, from $270.00 to $196.00 per day . . .

A saving of $16,800 per year* plus a saving of $500.00 per year in repair costs. *In one year modernization earned its cost and $5300.00 additional.*

Webster Service and Equipment have been applied in hundreds of other instances with comparable results. Evidence covering these gives striking proof not only of the opportunity for profit thru periodic modernization of heating systems but also of the desirability of selection of highest-grade material and design in original installations. We will be glad to show you the evidence.

*Based on 200 operating days per year

- since 1888

Webster *Systems of Steam Heating*

WARREN WEBSTER & COMPANY, Camden, New Jersey
Pioneers of the Vacuum System of Steam Heating
52 U.S. Branch Offices – *In Canada, Darling Bros., Ltd., Montreal*

More than 46,000 installations in America's finer buildings

WARREN WEBSTER & COMPANY, Camden, New Jersey
We would like to read about the money saved by "Modernization" of Obsolete Heating Plants.

Name..... Title.....

Address .....

HVM-10-28

How to please

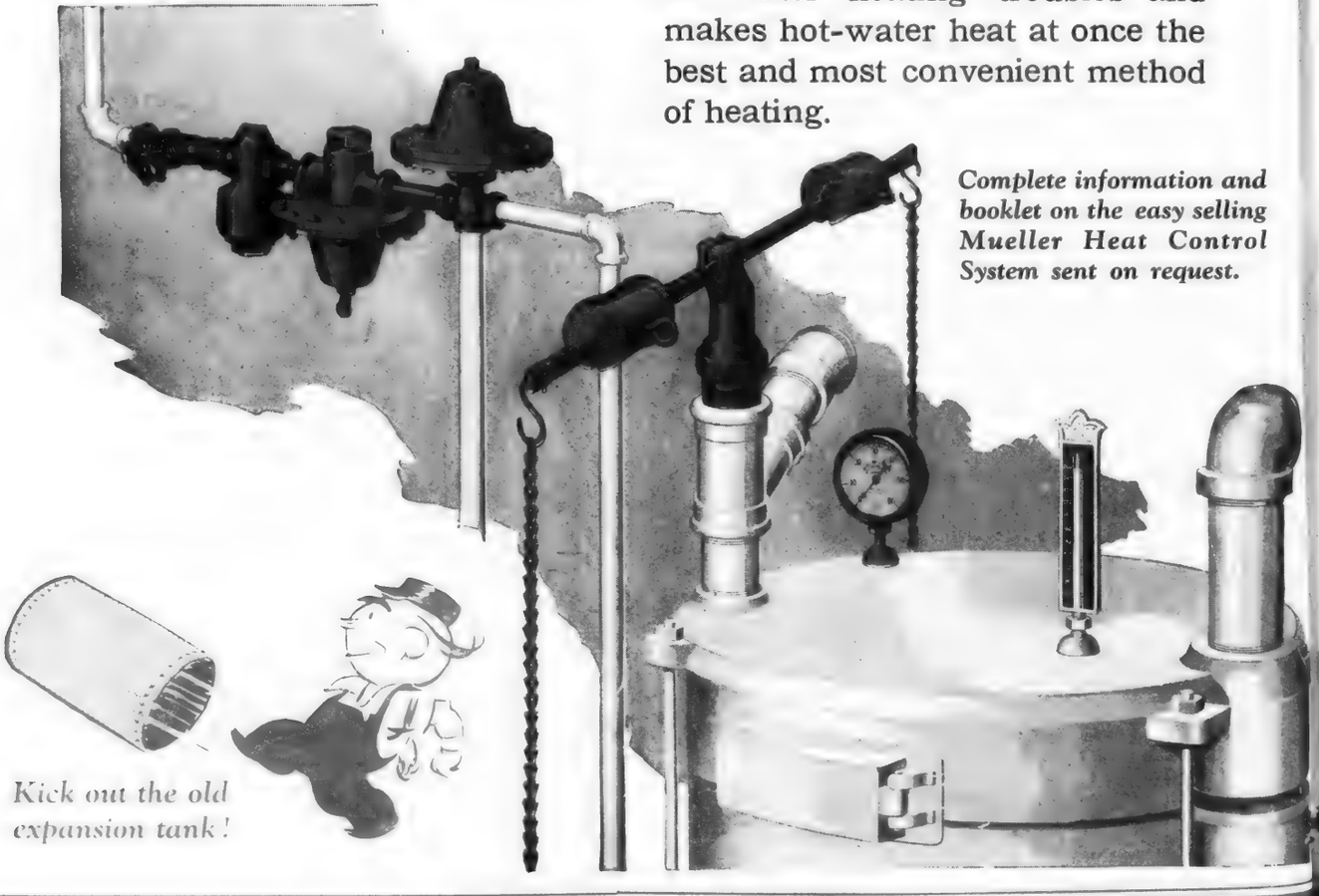
whot

for hot

Ask your customer which he prefers—regulating dampers by hand or automatic damper control. There's little doubt of what his answer will be!

Mueller Automatic Heat Control for hot-water heating systems gives 100 per cent automatic control of supply, relief and damper regulation and requires very little attention.

By eliminating expansion tanks, either open or closed, the Mueller System removes the one source of hot-water heating troubles and makes hot-water heat at once the best and most convenient method of heating.



Kick out the old expansion tank!

Complete information and booklet on the easy selling Mueller Heat Control System sent on request.

the man pays the bills

water heating plants

It's good business to please the man who pays the bills!

Not only do you build goodwill by installing Mueller Automatic Heat Control Systems on every job, both new and old, but you increase your profits at the same time. The Mueller System costs the customer no more than the troublesome old expansion tanks, makes a better job, is much easier to install and offers an attractive margin.

Through automatic control the water in the system is always fresh, valves are positive in action and the boiling point of water is raised, making possible increased heating efficiency. Of course, this is just another way of saying that the Mueller System saves fuel.

Install Mueller Automatic Heat Control Systems and kick out expansion tanks. Say goodbye to trouble and give your customers all the carefree convenience of dependable automatic control that sends uniform heat to every room.

Mueller selling points

1. No expansion tank, either open or closed.
2. Costs no more and is easier to install.
3. Water in system is always fresh.
4. 100 per cent automatic supply, relief and damper regulation. Requires only minimum attention.
5. Saves fuel.
6. Perfectly safe.
7. Valves are positive in action and are the safest type known.
8. Boiling point of water is raised, allowing more efficient heating.

MUELLER CO. (Established 1857) **Decatur, Illinois**

Branches: New York, Dallas, San Francisco, Los Angeles
Canadian Factory: MUELLER, Limited, Sarnia

MUELLER

Automatic Heat Control System

Developed through 20 years of Electrical Experience

WEBSTER service has its start in the Webster Laboratory—a splendidly equipped department for the study of ignition problems and the development and design of ignition devices . . . . This laboratory, as well as the entire plant itself and the methods and equipment employed therein, is the outcome of over twenty years of development . . . . Ever since it was introduced, the Webster Ignition Transformer has steadily increased in distribution and performance until it is now the final choice of most of the oil burner manufacturers on whose product electrical ignition can be used . . . . The advantages of Webster Transformer service can be explained to you by a request to our Engineering Department . . . . Professional advice is given gratis.

WEBSTER ELECTRIC COMPANY, Racine, Wis.
"Specialists in Oil Burner Ignition"

Webster Ignition Transformer

The Webster Ignition Transformer can be furnished with either single or double high tension terminals, for a variety of voltages and frequencies.

LOS ANGELES CITY HALL, ECONOMICALLY, EFFICIENTLY HEATED BY FOUR No. 5½ JOHNSON ROTARY OIL BURNERS INSTALLED BY ENGLISH & LAUER, OIL BURNER SPECIALISTS

John C. Austin, Albert C. Martin, John Parkinson, Associate Architects
Holmes & Sanborn, Construction Engineers, Mechanical Equipment
Lohman Bros., Heating Contractors

How *Los Angeles* solved its City Hall heating problem

The new 28-story City Hall in Los Angeles was ready for heating equipment. The selection of the most efficient equipment was important. Comparative claims were many. City experts, architects, heating engineers and contractors, studied them from all angles.

When the decision was made, Johnson Oil Burners were selected. Perfection of design and past performance—economical, trouble-free service to users everywhere—were the deciding factors.

Wherever you may go, from the Pacific to the Atlantic, you will find an ever increasing number of home owners, builders, and operators of large buildings, factories, and industrial plants enthusiastically praising the safety and efficiency of Johnson Oil Burners.

And because of this dependable performance, you can recommend and use Johnson oil burning equipment for every heating and power purpose.

For more than 23 years, in the exclusive manufacture of oil burning equipment, Johnson engineers have built to win this preference. This long experience is yours for the asking. Our Engineering Service will gladly help you in the solution of any heating or power problem.

MEMBER OIL HEATING INSTITUTE OIL HEAT

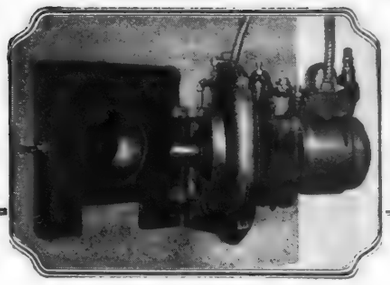
S. T. JOHNSON CO.

Main Office and Factory, 949 Arlington Ave., Oakland, Calif.

Factory Branches

SAN FRANCISCO, SACRAMENTO, STOCKTON, PHILADELPHIA

YOU WILL FIND OUR LOCAL REPRESENTATIVE'S ADDRESS IN YOUR TELEPHONE DIRECTORY



COMBINING simplicity with unusual accessibility Johnson Rotary Burners swing easily out of firing position for inspection.

JOHNSON OIL BURNERS

Listed as Standard by the Underwriters' Laboratories

An Opportunity for Men of Vision and Ability

Profits in the oil burner business are limited by the market for the burner you represent. There is a *Johnson* burner for every heating and power purpose: Rotary burners in three styles and six sizes; low pressure air, whirlwind, steam atomizing and natural draft burners, also electric and steam driven oil pumping and preheating equipment.

Every part of town has profit possibilites for the Johnson representative. Mail the coupon for complete information, stating territory desired.

Name *Address*

City *State*

A COUPLE OF *Developments in* OIL HEAT *that are significant*

ONE: the development of plain straightforward common sense in advertising, selling, and dealing with owners—by KLEEN-HEET.

TWO: the creation of new public interest in, and genuine demand for, the new small-home "CHALLENGER MODEL" KLEEN-HEET and the much-discussed "SERIES 800" KLEEN-HEET for larger homes and buildings.

These facts, existing right now, will bear investigation by any man, men, or firm, convinced of the real future in the oil burner industry. Right now we are hustling to keep up with demands by our present dealers. This is just a piece of news you can file, forget, or think about—as you see fit.

WINSLOW BOILER & ENGINEERING CO.

844 Rush Street, Chicago, Ill.

Shaw-Perkins

HIGH CONVECTION Radiators

For Steam and Hot Water Heating Cooling-Drying and Industrial Applications

Compact — Light in Weight

Sanitary

Heat and Cool Quickly

Several Models — Many Sizes

Made in One Piece Jointless Units as long as 14 Feet

Get the Full Story

SEND FOR CATALOG H

Shaw-Perkins Manufacturing Company

Pittsburgh, Pa.

GRANT
OIL HEAT MACHINE

A Quality Oil Burner

$130.00

A mechanical draft oil burner with return pumping system, an oil pilot operating as economically as a gas pilot, FULL AUTOMATIC CONTROL reduced to a boiler switch and thermostat.

These simplifications in design make it possible for us to offer the dealer a quality burner at a low price, and to cut sales and service resistance to a minimum—hence satisfied customers, dealers and salesmen.

GRANT HOME HEATER CORP.

127 Montgomery St., Jersey City, N. J.

Listed as
Standard
Underwriters' Laboratories
Established and Maintained by the
National Board of Fire Underwriters

Cool Weather

is the best time to cash in on the sale of ideal heat. Hundreds of home owners have been thinking that they would use oil heat for this winter but have been putting off giving their orders. Now that the cooler days are here they are making up their minds in a hurry and they want quick action. You can give it to them if you represent

AUTOMATIC OIL BURNER

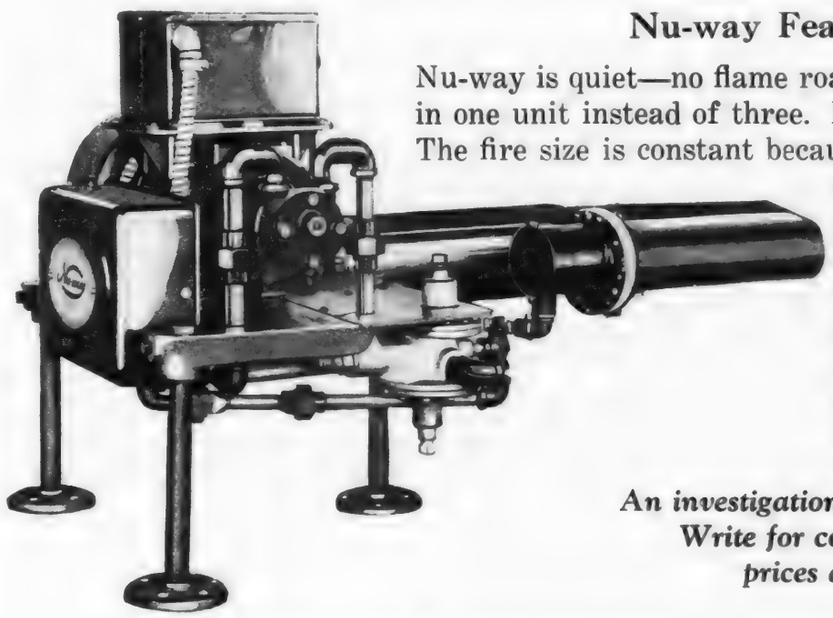
Nu-way

FOR HOME HEATING

Automatic Oil Burners

Never in the history of the Nu-way Corporation has the demand equalled that of this year, and manufacturing facilities have been enlarged to handle even rush orders promptly.

If your territory is still open, write or wire for prices and terms.



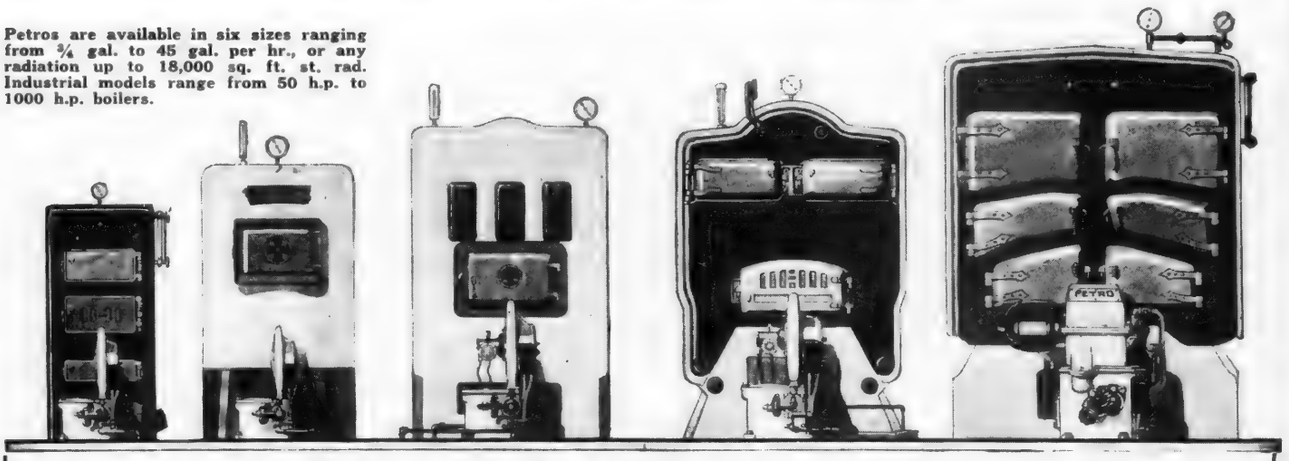
Nu-way Features

Nu-way is quiet—no flame roar. It is simple—built in one unit instead of three. It has no extra pump. The fire size is constant because the pressure is instant, not affected by change of fuel. The fire is easily controlled because it is of low velocity. Nu-way burns less oil and the control of atomizer pressure is strikingly simple.

An investigation will convince you. Write for complete details, prices and terms.

The Nu-way Corporation, Rock Island, Ill.

Petros are available in six sizes ranging from ¾ gal. to 45 gal. per hr., or any radiation up to 18,000 sq. ft. st. rad. Industrial models range from 50 h.p. to 1000 h.p. boilers.



A Petro—for every type home

New record set for dependability

Based on 25 years' success in industrial oil heating, Petro now offers a complete line of six domestic oil burners. All are listed as standard by the Underwriters' Laboratories to use the cheapest oil fuel on the market available for residence use. All six are fully automatic.

A recent survey made by a great university shows that only 1.91 service calls were made per Petro per year. Many Petros installed four and five years ago were included in this survey. This unusually small number of service calls indicates the extreme dependability of Petro.

By putting air to work, Petro engineers have simplified oil heating. Made it more quiet, more economical, more dependable. In fact, it is so dependable that each Petro installation can be absolutely guaranteed.

Everyone interested in better heating should have at hand all the important facts about Petro. These will be sent anyone on request. As fast as the highest type of distributor and dealer can be trained, new territory is being opened up. To any well rated concern interested in building up a substantial and profitable oil burner business, we will gladly supply a Petro to prove its superiority. Write today for details of this demonstration offer.

Petro's Board of Directors

Robert Adamson	Dr. John A. Harriss
T. Coleman DuPont	Alfred O. Hoyt
W. C. Durant	Reginald H. Johnson
Frederick Ewing	Louis G. Kaufman
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W. C. McTarnahan
Pres. Petroleum Heat & Power Co.

PETRO

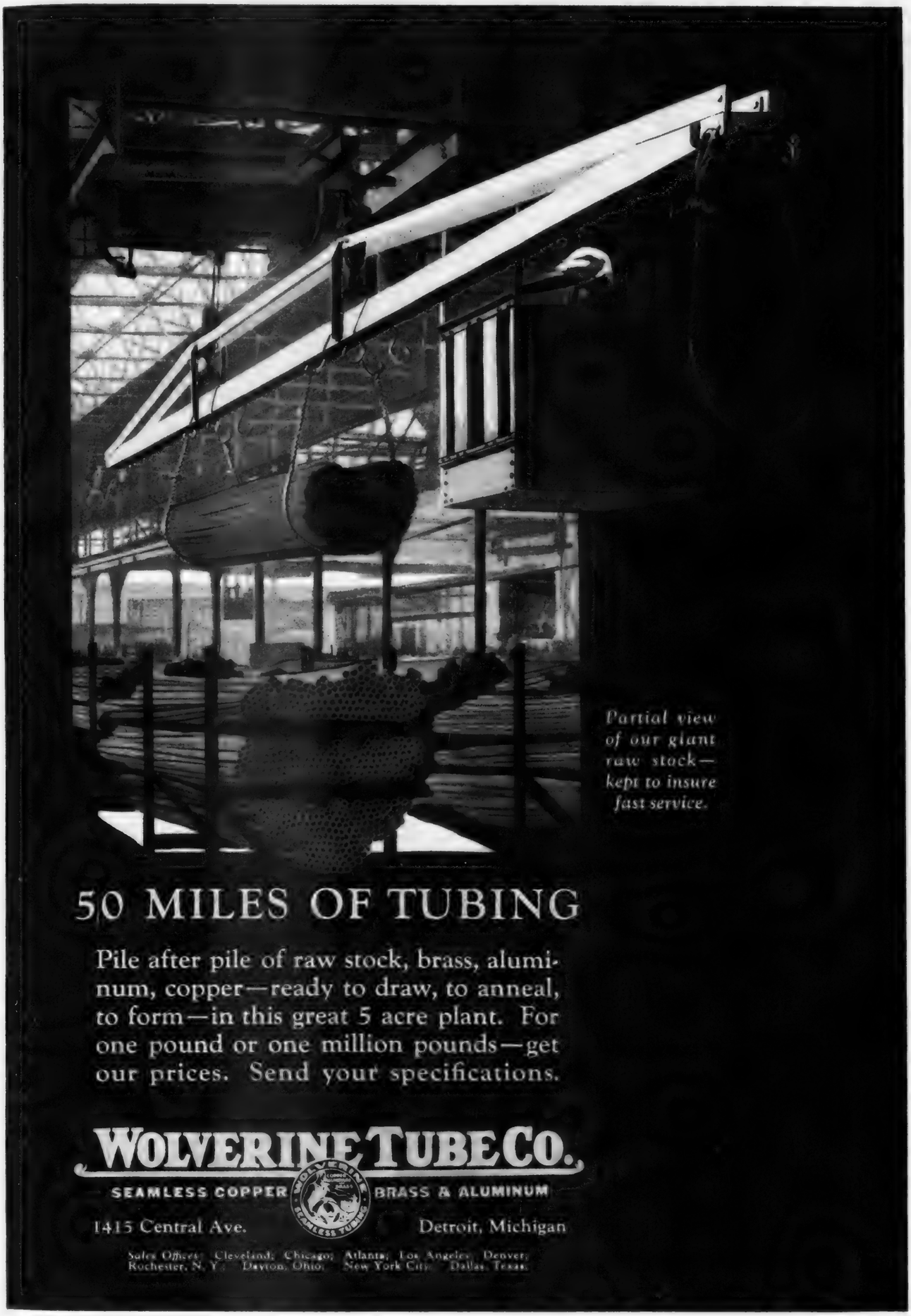
REG. U.S. PAT. OFF

Domestic and Industrial Oil Burners

Petroleum Heat & Power Company, Stamford, Conn.

Makers of oil burners since 1903

FESS SYSTEM CO. (subsidiary) 220 Natoma St., San Francisco, Calif.



Partial view of our giant raw stock—kept to insure fast service.

50 MILES OF TUBING

Pile after pile of raw stock, brass, aluminum, copper—ready to draw, to anneal, to form—in this great 5 acre plant. For one pound or one million pounds—get our prices. Send your specifications.

WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

1415 Central Ave. Detroit, Michigan

Sales Offices: Cleveland; Chicago; Atlanta; Los Angeles; Denver; Rochester, N. Y.; Dayton, Ohio; New York City; Dallas, Texas.

▲ ▲ *Only Nokol Offers* ▲ ▲

ALL ACCEPTED MODELS

OF AUTOMATIC OIL BURNING EQUIPMENT

▲ ▲ *Each of Long Proven Merit!*

In perhaps no other industry is the leader so outstanding as in the manufacture of automatic oil heating equipment. For now the Nokol line includes all accepted models of oil burning equipment —each model of long proven merit in the field.

Think what this Nokol leadership means to you! What an amazing opportunity for profit to be able to say—as no other Dealer in your community may honestly say—"We make our recommendations according to the exact requirements of your heating plant, and without prejudice, for we—and we alone—have *every* accepted model of equipment for the automatic heating of homes with oil."

Every accepted model of oil burning equipment ...

And a range of sizes and capacities of each model to meet the exact heating requirement to which the model is adapted . . .

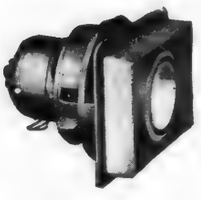
Completely covering the oil burner field.

No one particular kind of oil burner will today adequately serve all existing conditions . . . no more than one kind of breakfast food, or one style of clothing will meet the exacting requirements of different individuals . . . Nokol was the first to recognize this condition, and the first to meet it—successfully!

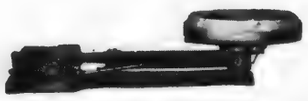
Prepared with . . . a model for every requirement . . . a size for every job . . . a price for every purse . . . an unlimited market is open to you. Reap now the harvest of oil heat profits with the one *complete* line in the industry . . . Let us give you all the facts . . . today!

AMERICAN NOKOL CORPORATION

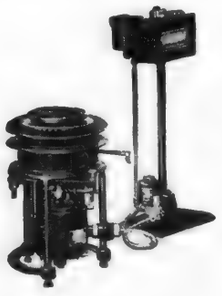
4229 SCHUBERT AVENUE, CHICAGO, ILLINOIS



Model GR

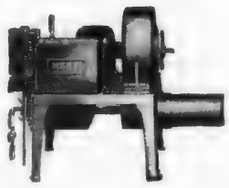


Model N



Model R

Model L



Model G

NEW Noiseless NO COAL Nokol

REG. U.S. PAT. OFF.

CLEAN AUTOMATIC OIL HEAT

FUEL ECONOMY *goes with* HEATING EFFICIENCY *in* ELECTROL

KNOW ELECTROL BY THE HOMES IT HEATS

Home of H. B. Stanz, Jr., Whitefish Bay, Wisconsin. Heated by Electrol Model TJ in a hot air furnace.

THE advanced principles and design employed in Electrol result in maximum heating efficiency. Fuel economy and heating efficiency are combined in Electrol.

Quiet... All-Electric... Entirely Automatic, Electrol is as fine as engineering skill and exceptionally strong financial resources can produce. It is the oil burner with *The Master Control* which watches over the burner's operation, safeguarding comfort day and night.

Electrol's positive, automatic electric ignition eliminates the need for a gas pilot light. Mechanical fuel atomization, with the scientific mixing of the correct amount of air, produces abundant heat with the minimum consumption of fuel. The oil and air supply are controlled separately,—an important part in producing best results.

A good burner to recommend

You can recommend Electrol with the certainty that it will make good and live up to expectations. Thousands of successful installations in every section of the country are evidence of Electrol's economical and dependable operation. Likewise, you can work with the Electrol dealer secure in the knowledge that he will respect and protect your professional judgment. The Electrol dealer will not recommend an Electrol or proceed with the installation unless he has determined in advance that the burner will give complete satisfaction in the existing heating plant.

A new source of income for you

Without any investment whatever, you can develop a new source of income for yourself by co-operating with the Electrol Sales and Service Representative in your city. He will be glad to explain the details of this offer and to show you how to work with him to your mutual benefit and advantage.

Talk it over with the nearest Electrol dealer. If you don't know his name we shall be glad to put you in touch with him.

ELECTROL INC. *of* MISSOURI
177 Dorcas St. St. Louis, U. S. A.

A Size for Every Job

Electrol is made in three sizes. Model TJ has a range from 200 to 800 square feet of steam radiation, including piping and risers or equivalent. Model T, from 600 to 3,000 square feet of steam radiation. Model TD from 2,000 to 8,000 square feet of steam radiation.

An Opportunity for Profit

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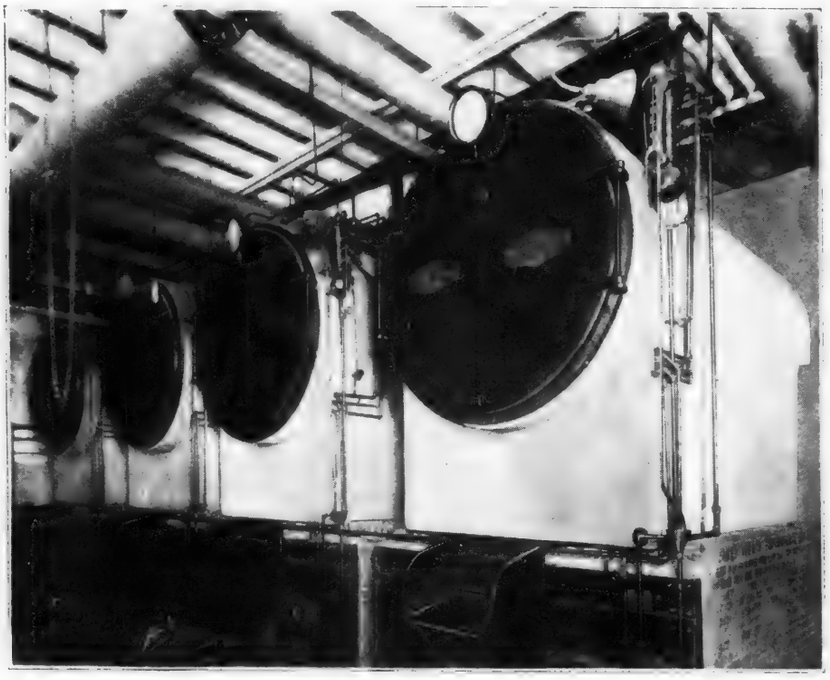

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The Heating & Ventilating Magazine

Volume XXV

Reg. U. S. Pat. Off.
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Number 10

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YEARLY SUBSCRIPTION $2.00 **SINGLE COPIES, 30 CENTS**

Published monthly at 386 Fourth Avenue, New York, by The Heating and Ventilating Magazine Company.

Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

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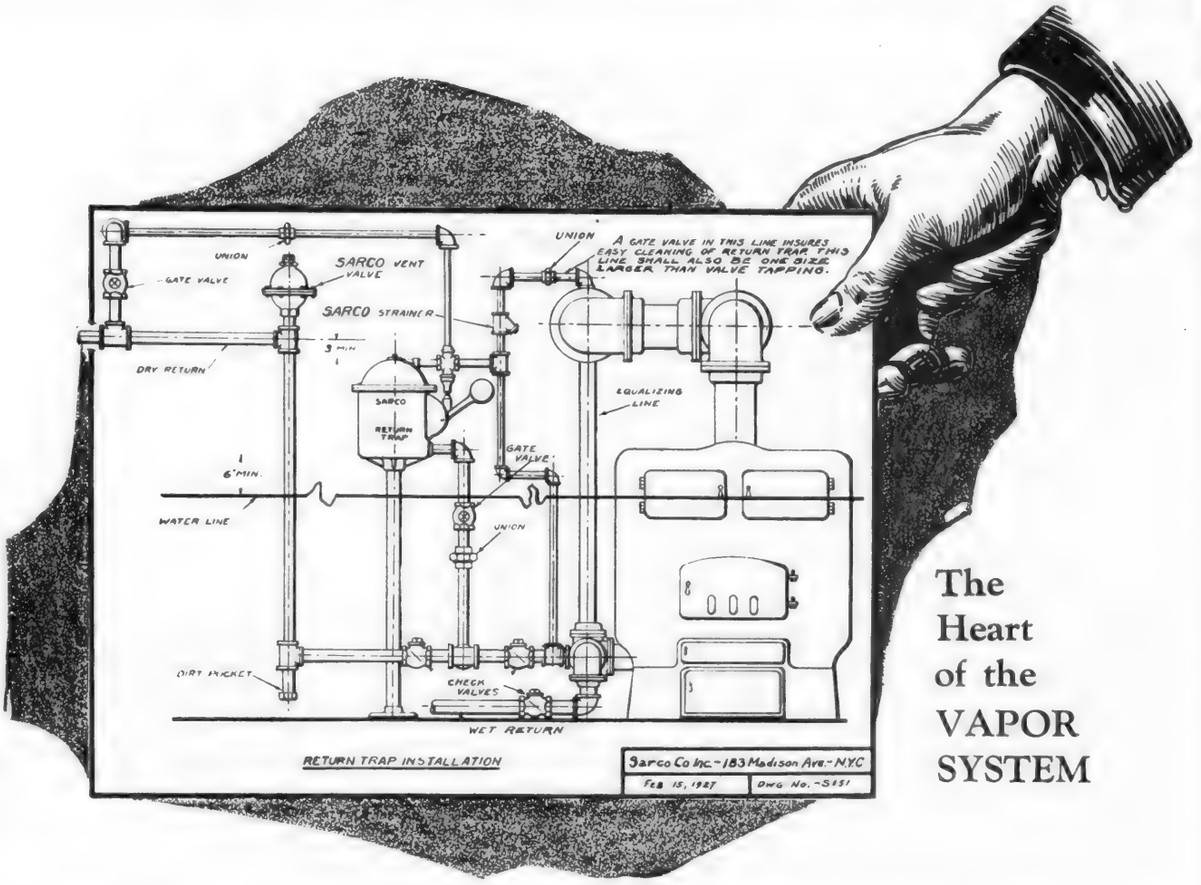
The Generations

IT is characteristic of any generation to look with alarm on the proclivities of the youth of its day. The present generation of course, is no exception. By the same token, we may be fairly certain that the young people who now give us so much concern will find plenty to criticize in the youth of 1940.

Curiously enough, the picture is reversed in commercial life, at least as far as it applies to the heating industry. The first generation of heating men, as we all know, came up from the ranks and were the "master steam fitters" of their day. Today we know their successors as "heating contractors," and the distinction marks their advance during the intervening years.

What they will become in the next generation is already indicated by the new conception of the comfort and convenience of modern heating. They will be more than steam fitters or heating contractors and will have the added prestige their service warrants.

A. V. Armagnac



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A MONTHLY JOURNAL OF ENGINEERING PROGRESS

The Heating & Ventilating Magazine

Volume XXV OCTOBER—1928 Number 10

HEATING a Suburban Home WITH GAS

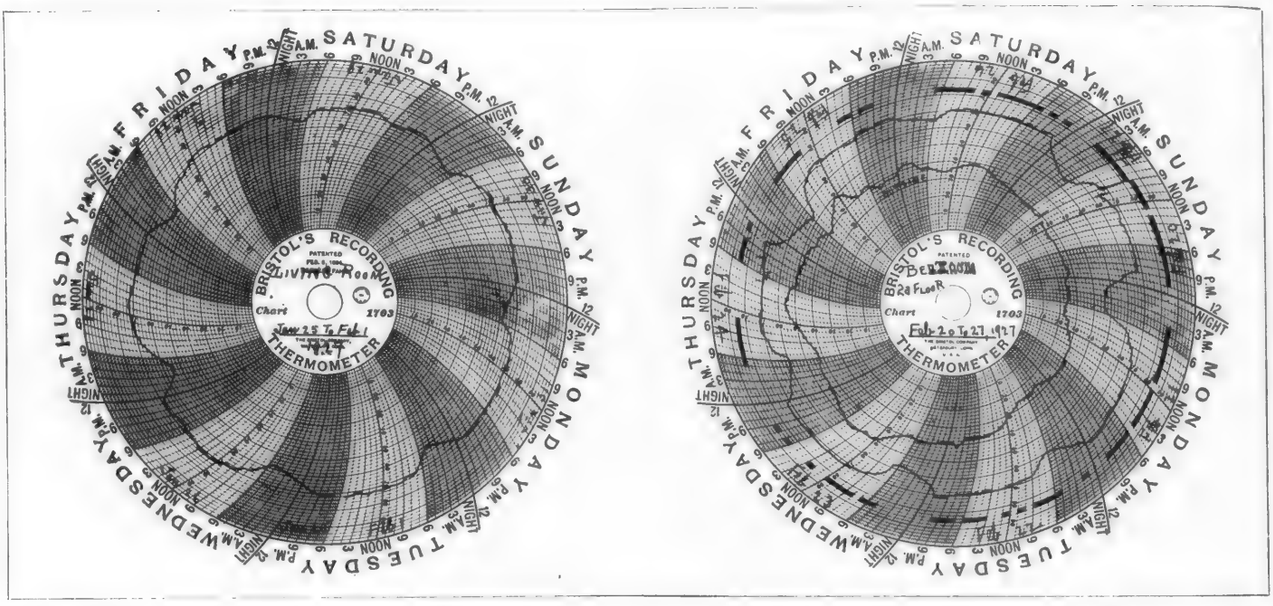
Technically Trained Home-Owner Compiles Valuable Data on Gas Consumption in His Insulated House

By E. C. Uhlig

Chief Chemist, The Brooklyn Union Gas Company

GIVEN a house thoroughly insulated and guarded against heat losses, for what sum of money can it be heated by gas, and how uniform can the room temperature be maintained during the heating season?

In most of the residences equipped with gas heating appliances, gas replaced other fuels, and the houses themselves were not designed and constructed solely for the use of this fuel in a central heating plant. To obtain data that would be complete from an engineering viewpoint, an insulated house designed for heat conservation was used to carry on the experiment hereinafter described, the results being the answers to the problem stated.



Figs. 1a and 1b. Typical Recording Thermometer Charts Showing Temperature Conditions Inside and Outside of Gas-Heated House

The house is located at St. Albans, Long Island, in the Borough of Queens, New York. The plot, which is on the corner of two streets, is 50 ft. by 100 ft., the house occupying about 970 sq. ft., the front facing south. It is exposed on all sides, the nearest building being across the street to the west. Of English architecture, the house is half timbered, covered with stucco, and roofed with asphalt shingles, in which crushed stone fragments are imbedded.

A cement-block foundation forms the cellar walls, to the inside of which a coat of cement has been applied. The cellar is fully excavated and has a ceiling height of 6 ft. 9 in., the floor is concrete, waterproofed with sodium silicate, and the ceiling is covered with "sheet-rock" boards.

There are seven rooms, three on the first floor with 8 ft. 2 in. ceilings, three on the second floor, of the same height, and a bedroom in the attic, with 7 ft. 6 in. ceiling.

Dimensions of the rooms are:

Living room—19 ft. x 21 ft.
Dining room—14 ft. 9 in. x 12 ft.
Kitchen—9 ft. x 10 ft.
Bedroom—12 ft. 6 in. x 19 ft.
Bedroom—12 ft. 4 in. x 14 ft.
Bedroom—8 ft. 10 in. x 14 ft.
Bedroom—9 ft. x 13 ft.

There is a bathroom on the second floor and one in the attic. The attic also has an unheated storeroom with an outside window. Adjoining the kitchen is an entry with an outside sash door.

Including two sash doors in the large bedroom on the second floor, the exposed window-glass areas are as follows: Cellar, 24 sq. ft.; first floor, 104 sq. ft.; second floor, 70 sq. ft.; attic, 15 sq. ft. The total area, exclusive of that of the cellar windows, which was not used in calculating the heating requirements, is 189 sq. ft.

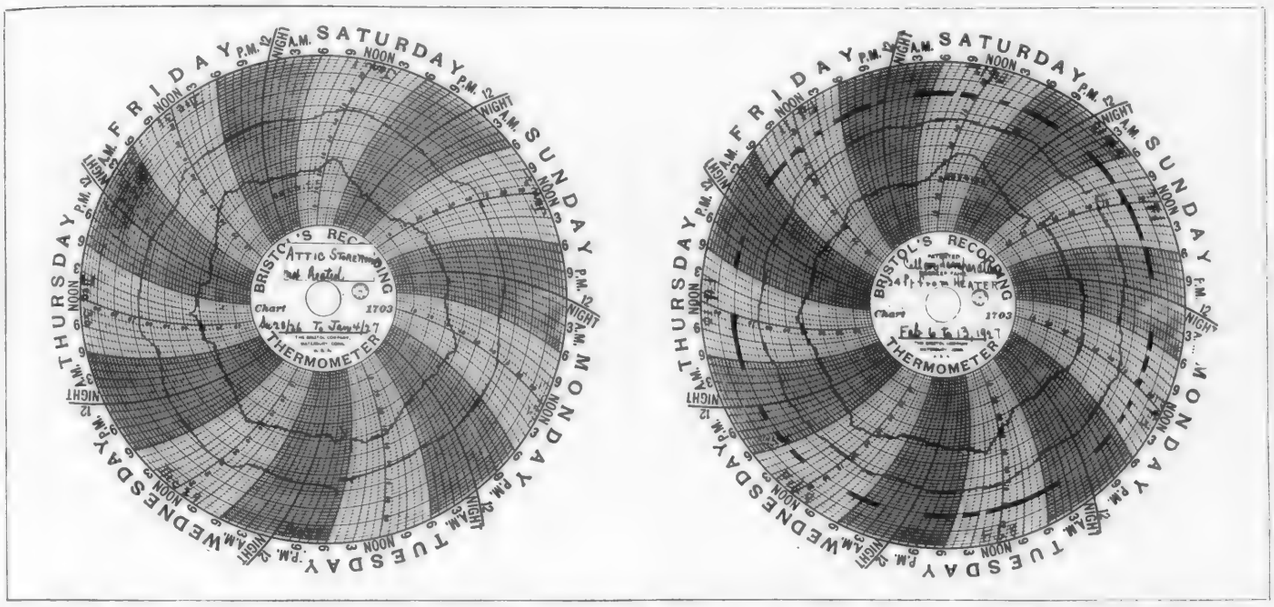
Fig. 3. How Cork Insulation Was Applied to the Attic Ceiling

How the Heat Loss Was Minimized

Insulation is provided by Armstrong corkboard in sheets measuring 12 in. x 32 in., nailed to the studding. (Fig. 3) These sheets are 1½ in. thick on the exterior walls and 2 in. thick on the attic ceiling. The ceiling of the western end of the living room, under the second floor porch, also is insulated. Plaster was applied directly to the corkboard and the bond has been found to be entirely satisfactory.

Heat losses were further minimized by metal weatherstrips on all windows and outside doors. It was first thought that the extent of window glass in the living room—about 59 sq. ft.—would require that storm sash be put on the north and west windows, but this was not done, and their absence was not felt.

The house is heated by steam from an Ideal gas boiler (Fig. 6), having four water sections and



Figs. 2a and 2b. Attic, Cellar and Outdoor Temperature Records Are Shown by the Solid Lines While the Broken Line on Charts 1b and 2b Shows the Periods During which Gas Burner Was "On"

three burner units, the maximum gas consumption being 240 cu. ft. per hr. The boiler is rated at 525 sq. ft. of radiation, including piping. It was calculated that 355 sq. ft. of net radiation would be sufficient for heating the house, and 357 sq. ft. was installed.

Heating is controlled by a Honeywell thermostat, located on an inside partition of the living room near the entrance to that room. It was somewhat difficult to select a place for the thermostat, because consideration had to be given to using the wall space, not interfering with the house electric lines, and avoiding partitions through which steam pipes passed. The functioning of the thermostat in this location gave a very comfortable, nicely controlled temperature, as can be seen by an inspection of the recording thermometer chart. (Fig. 1a)

The thermostat was set to maintain 70° F. from 7 A.M. to 10:30 P.M. with a minimum of 55° F. at any time. It could, however, be set at some low temperature, above 55° F., which was done whenever the family was out for some hours, in which case 65° F. was the temperature usually selected. Toward the end of the heating season it was customary to set the thermostat at 65° F. at 9 A.M., and back to 70° F. at 7 P.M., thus avoiding the use of gas during warm spring days. The temperature charts generally indicate that, in cold weather, the house lost heat at the rate of 1° per hour when the boiler was off and gained from 4° to 5° per hour when the boiler was working.

Making Gas-Consumption Records

A large meter was installed to measure the gas used for heating, the gas used for other household purposes being measured by a separate meter. In addition, a demand meter was placed in tandem with the larger meter to ascertain the gas burned hourly in the boiler. This consists of an ordinary gas meter, in the top of which was inserted a drum carrying a chart. The drum is revolved by clockwork and the chart is divided into days and hours. (Fig. 8) Whenever 10 cu. ft. of gas has passed through the meter, a pin on the axle of the 100-ft. dial engages a lug which moves the pen, and a mark is recorded on the chart. By counting the marks made in any hour, the cubic feet of gas consumed can be determined. The closeness of the marks indicates the rate of consumption. Fig. 8 shows two typical charts, one of which was made in a week of low outside temperature and the other in a week of milder weather.

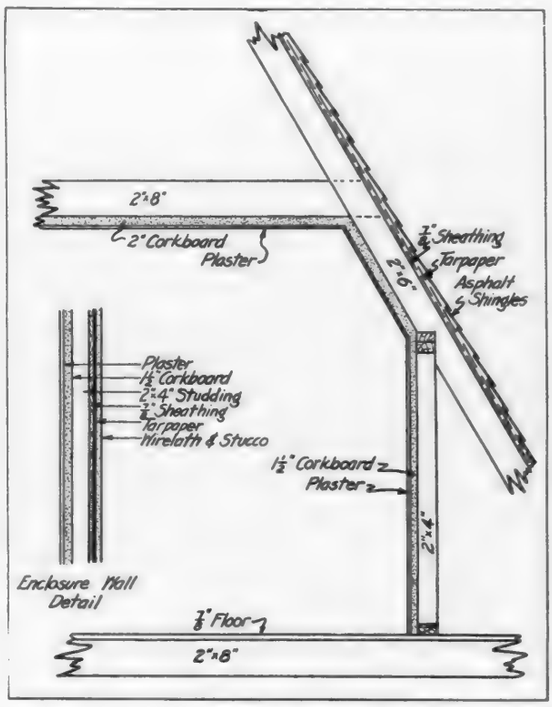


Fig. 4. Section of Walls Showing Insulation Applied to Gas-Heated House

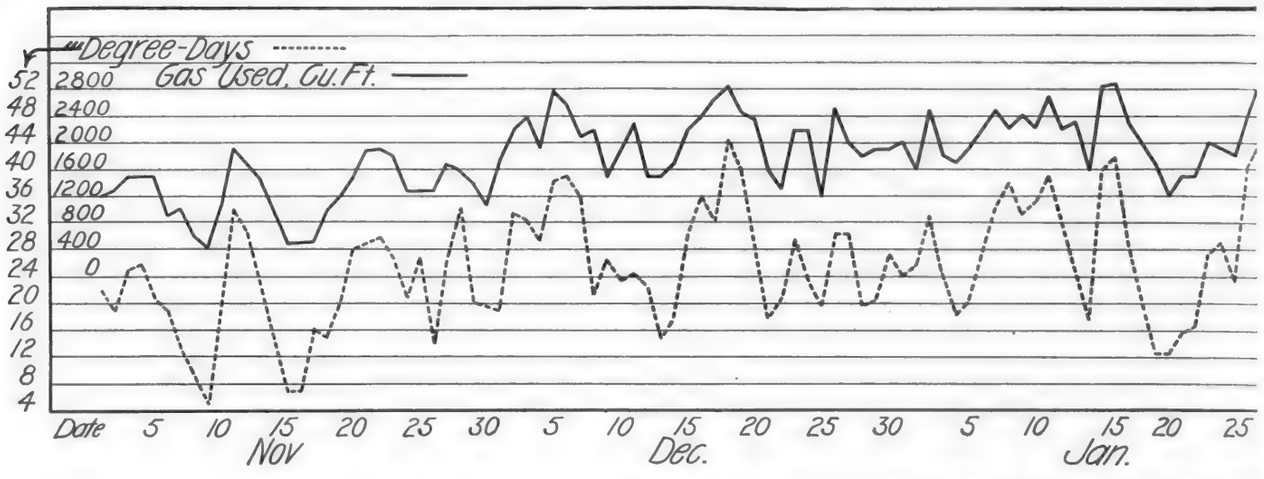


Fig. 5. Gas Consumption as Checked by Recording Gas Meter

The boiler was started on October 18, and operated until May 18—a period of seven months. Starting November 1, the meter was read daily, the time selected being after 10:30 P.M., when the boiler was off for the night. Subsequent to November 30, a Bristol recording thermometer was used to obtain a temperature record. This instrument usually was placed in the living room near the thermostat, but occasionally was moved to other parts of the house and left for one week in each place. On January 12 the demand meter was installed and the charts were renewed every few days until May.

Taking Temperature Records

It was found that, with this gas-fired steam boiler and the thermostat control, a uniform temperature could be kept in all parts of the house, as is evidenced by the recording thermometer charts, which show the actual temperature conditions throughout the house. The recording thermometer was located in the following positions for the periods named:

Fig. 6. Gas-Fired House-Heating, Water-Heating and Incinerating Plants in Home which Was the Subject of these Tests

Living Room—
- On piano bench near center of east side, December 1-7.
- Same location, and also on the floor, December 7-14.
- Two feet under thermostat and on floor below thermostat, December 14-21.
- Two feet under thermostat, December 21-28.
- Two feet under thermostat, January 25—February 1 (see Fig. 1a).
- N. E. corner, February 1-6.
- One foot under thermostat, February 27—March 6.
- One foot under thermostat, March 6-10.
- One foot under thermostat, March 27-April 3.
- One foot under thermostat, April 3-10.
- One foot under thermostat, April 10-17.

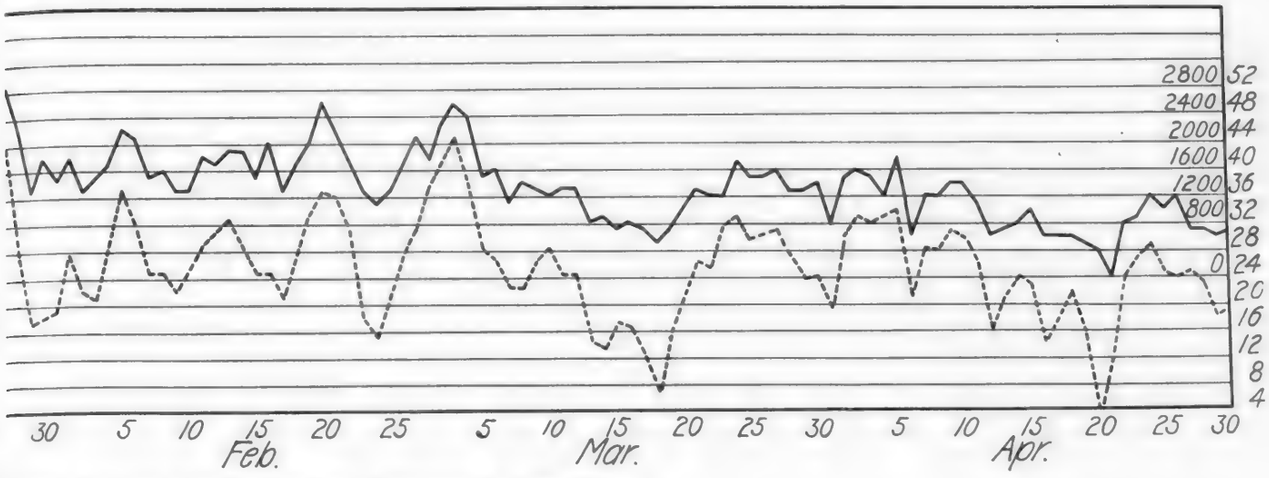
Dining Room—
- N. W. corner, near entrance to room, January 18-25.
- N. W. corner, near entrance to room, March 20-27.

Second floor bed room—February 20-27 (see Fig. 1b). This room was occupied, and the effect of opening the window for the night was very evident on the charts. On some of this series of charts a heavy band was drawn outside of the temperature curves showing the periods when the boiler was working.

Attic bed room—January 4-11. This room was not occupied, but was heated by a radiator.

Stairs—These locations were about the middle of the north wall of the house.
- Between second and third floors, January 11-18 and April 17-24.
- Between first and second floors, April 24-May 1.

It is common knowledge that the attic in the usual type of house is cold in winter, and to ascertain what effect the insulation would have on the unheated part, the recorder was set in the store room, about 2½ ft. from the floor. This is shown on the chart (Fig. 2a) from December 28-January 4, on which the outside temperature also is shown. It will be noticed that the inside temperature generally rises and falls with the outside temperature, but the rise just before noon is quite marked. This was caused by the radiant energy from the sun,



Closely Followed the Heating Load Expressed in Degree-Days

coming through the window, the room being on the south side of the house.

It is a well-known fact that the temperature in the cellar of a house heated by a coal-fired furnace is usually high, rising at times to about 80° F. under the floor of the rooms above. The gas-fired boiler, being well insulated, and the gas burning only at intervals, the tendency of the cellar temperature is toward uniformity. The recording thermometer was placed in the cellar in two locations:

February 6-13, diagonally across the cellar on the south side about 24 ft. from the boiler, which was on the north side. The chart, Fig. 2b, shows a very uniform temperature, ranging between 60° F. and 67° F. The outside temperatures also are shown.

March 14-20, on the north side, diagonally behind the boiler, and 3 ft. distant from it. This chart also shows a very uniform temperature ranging between 63° F. and 68° F. On March 17 at 1 P. M., the inside and outside temperatures were equal, and on March 16 at 2 P. M., and on March 18 from 2-8 P. M., the inside temperature was below the outside temperature. The broken curve on each chart, showing the periods during which the gas was burning, indicates how little the operation of the boiler influenced the cellar temperature.

Toward the end of April, the rise in outdoor temperature naturally requiring less work from the boiler, necessitated a change in our method of control. From April 16 to April 20, the thermostat was allowed to function as usual until 7:30 A. M. when it was turned down to 65° F., and at 7 P. M., it was again set at 70° F., to heat the house during the evening. After this, practice was to turn the thermostat to 70° F. whenever it was thought necessary.

Even Temperature Regardless of Thermostat Location

It was found that the thermostat control maintained the house temperature at the point desired no matter where the recorder was placed. The relation between this control and the gas consumed also will readily be seen.

We all are familiar with the wide differences in temperature between the floor line and ceiling in rooms in uninsulated homes. Thermometers were placed at different levels in several rooms, and the temperature differences were found to be very slight, undoubtedly due to the insulation.

Humidity and Effect of Wind

No attempt was made to humidify the air in the house, as it was felt that, in a new house, the slow drying of the plaster would furnish moisture. Tests for relative humidity were made occasionally during the winter, and the results are shown in Table 1. It will be noted that the relative humidity varied from 22% to 57% in the living portion of the house and from 47% to 66% in the cellar. The relative outside humidity reported by the Weather Bureau also is given.

A strong wind, on a cold day, will cause an increase in fuel used in the normal uninsulated house. There appears to be no definite measure for this,

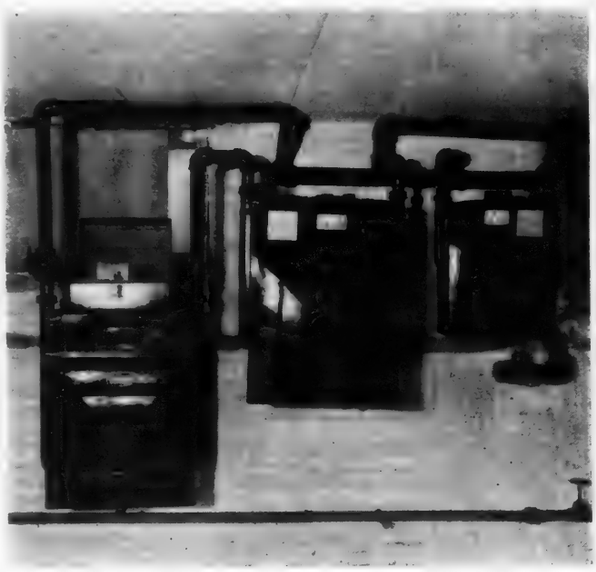


Fig. 7. Gas Meters Used to Record Gas Consumption
The recording device attached to the meter of the house-heating boiler is shown on top of the left-hand meter.

Table 1. RELATIVE HUMIDITY

Season 1926-27

Date		Living Room Time	Living Room Per Cent Humidity	Outside Time	Outside Per Cent Humidity
November	29	6:00 P.M.	57	8:00 P.M.	76
December	2	6:00 P.M.	47	8:00 P.M.	38
	2	9:30 P.M.	34		
	3	8:00 P.M.	39	8:00 P.M.	90
	4	2:00 P.M.	38	12:00 Noon	62
	5	11:00 A.M.	38	12:00 Noon	87
	6	9:00 P.M.	32	8:00 P.M.	53
	11	4:00 P.M.	42	12:00 Noon	94
				8:00 P.M.	81
	23	8:30 P.M.	33	8:00 P.M.	65
	26	12:30 P.M.	37	12:00 Noon	81
January	2	11:00 A.M.	35	12:00 Noon	49
	4	6:00 P.M.	40	8:00 P.M.	90
	16	12:00 Noon	25	12:00 Noon	39

Table 2. COST OF HEATING

Season 1926-27

Month	Gas Used Cu. Ft.	Percentage of Yearly Total	Cost
October	13,000	4.34	$14.95
November	37,600	12.55	43.24
December	64,000	21.38	73.60
January	63,500	21.21	73.02
February	47,800	15.97	54.97
March	40,700	13.59	46.80
April	28,100	9.39	32.32
May	4,700	1.57	5.41
Total	299,400	100.00	$344.31

but there is a general agreement that wind velocities above 15 mi. per hr. cause an increase in fuel consumption, each mile per hour above this velocity being equivalent to a drop in temperature of 1°.

An attempt was made to determine the possible effect of wind by studying the records for January and February, in which months the wind was quite high at times. Gas consumption in cubic feet per degree day was determined, and against these figures the wind velocity was plotted. There was no apparent agreement between gas consumption and the wind curves, indicating that the wind has little, if any, effect on gas consumption in an insulated home.

Cost of Heating

Table 2 shows the cost of gas used in heating the house, together with the percentage of gas used during each month from October 18 to May 18, a period of seven months. The total gas used was 299,400 cu. ft., which, at $1.15 per M. aggregated $344.31. This is equivalent to 23¾ tons of anthracite coal at the usual price in this community—$14.50 per ton. The information that I have been able to obtain on the costs of heating other homes of approximately the same construction, frame and stucco, but not insulated, is of a general nature, and indicates that, when that fuel is used and the entire house kept warm, the consumption is about 17 tons which, at $14.50 per ton, amounts to $146.50. If owners of such houses enjoy the services of a furnace man for six months at a cost of $15 per month—the charge in this locality—the comparative cost will be $336.50, or almost the exact cost of gas heating for my home.

(Continued on Page 73)

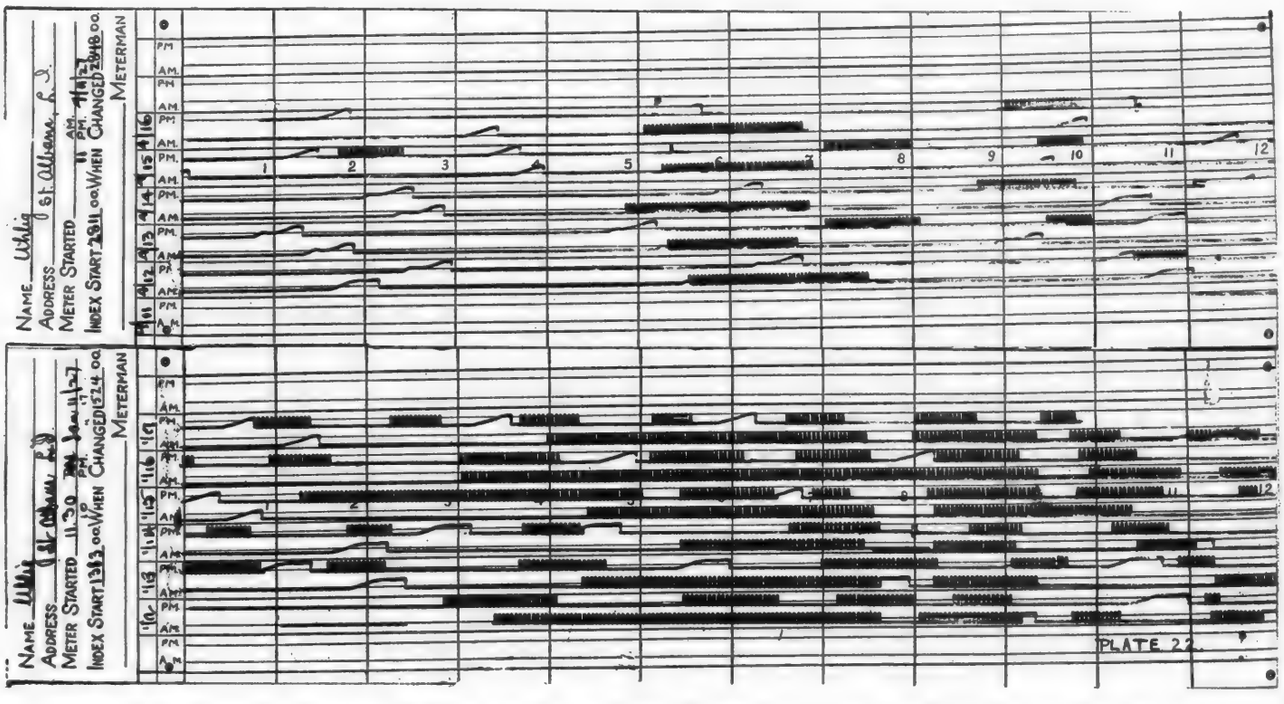


Fig. 8. Chart from Recording Gas Meter Showing Rate of Gas Consumption of House Heating Boiler

Principles and Methods of Heat Utilization

While the Policies Outlined Apply Particularly to District Heating, Nevertheless They Are Applicable to Almost Every Business Endeavor in the Heating and Ventilating Field

By Prof. C. H. B. Hotchkiss,

Department of Heating and Ventilating Engineering, Purdue University

DIVISION of public utility enterprise into three departments—production, distribution and utilization—is of long standing. Such a segregation follows logical lines. In general economics this same division often is referred to as production, distribution and consumption. It seems that the first of these three divisions to receive attention are those of production and distribution—an entirely natural situation. Utility managements obviously are concerned with them. Machinery for production and distribution is the actual physical property of the company. There is no question but that it is a subject for thought and study, and for use in securing desirable results. Consequently it is but natural that these two factors should first receive attention.

This is not true of consumption. After the customer's premises are reached and the product is delivered to his property line, the sale is completed. The product is his. Apparatus for using it is his, and not that of the utility. At first thought it would appear that the interest of the utility might well—or ought to—end here; that further interest is uncalled for, and perhaps might be of questionable value. It might even be that the customer would resent any attempt to influence his methods of using his own property in any way he pleased. It might be to the interest of the utility management to encourage the customer to use his devices in the *worst* way possible, since such use probably would result in larger sales. This indeed was formerly the attitude of business in general, and still is, in some lines. The idea that the seller's interest ends when the buyer has bought is too deeply ingrown to be completely overthrown on a moment's notice.

"Service"—an American Institution

Gradually there has grown up in this country—and nowhere else apparently—the idea that a seller must continue his interest in his product after the sale is made. This feeling has resulted in so-called "service" movements of so many kinds. They are alike basically, in that they are intended as moves to assist a customer in using his property to his own best advantage. This now appears to be perfectly good philosophy, as well as hard-headed business sense, since it has been demonstrated so many times that the use of this principle eventually will result in increased confidence, increased satisfaction, increased demand, and consequent increased sales. This *idea* of service appears to be firmly established and generally accepted. Questions in connection with it now usually have to do with methods and results rather than with its acceptance.

"Service"—in the Electrical Industry

Certain leaders in the electrical industry were quick to realize the importance of this principle. These managements courageously moved forward and adopted the idea wholeheartedly. The electrical industry has led in developing this idea—that interest must not stop with the signing of the contract. Outstanding executives are of the opinion that this policy toward their customers has become their most valuable asset and has been a very powerful factor in promoting the rapid rise of that industry.

The question early arose in this field as to just how far the policy of assisting the customer should be carried. Were energy-saving devices and methods to be encouraged up to the point where commercial foresight indicated no further advantage to the seller? Or, were they to be developed to the greatest possible extent even though they appeared to offer nothing but curtailment of business? Be it said to the credit of the leaders that the industry took a firm and positive stand that the aim should be *nothing short of perfection* in electrical devices. This policy has since demonstrated its soundness, for by its use the free and steady development of electrical apparatus has followed and a good feeling has been created. Customers have appeared for practically every electrical device which has been developed. The industry has moved steadily forward, increasing its volume continually in spite of the advent of smaller-current-consuming devices, and in spite of its efforts to assist customers in keeping their consumption, for any one device, at a minimum.

From the foregoing it should be clear that, in district heating, this "utilization" is nothing more or less than one aspect of "service." It is an attempt to assist the customer in a wise and intelligent use of steam purchased from the utility. It

From an address delivered at the Second District Heating School, held at Purdue University.

may be argued that this is the customer's business, but the fact is that few customers of district-steam utilities possess staffs of their own supplied with the necessary technical knowledge to permit them to use their steam effectively. The utility company seems compelled to develop such a staff, through default, if for no other reason.

Probably because of the shortness of time which has elapsed since its inception, or, perhaps, because the need has never been felt, no one appears yet to have stated definitely the ultimate ideal of utilization or customer-service work with district steam. A whole-hearted acceptance of the principle would demand a statement something like this:

"Utilization work has for its aim the ideal that every customer shall use every pound of steam he pays for, to his own best advantage. The utility will exert every legitimate and sound effort in its power to assist in the realization of this aim, without regard to its effect, trusting fully that eventually such efforts cannot fail to produce their reward."

This can be said to be the principle of utilization work. So far as I can see there is no other principle.

Growth of the Idea

Let us now briefly examine the development of utilization efforts in the steam-heating utilities. Some work of this nature has been done in the past. It probably has received its greatest impetus and consideration within the last two or three years. Outside of some more or less isolated cases it is a comparatively recent development in steam work. The N.D.H.A. took notice of the importance of this work in 1921, when a heat utilization committee was formed to study this subject. This committee reported in 1923, and has reported annually since. Its efforts, and the results of its studies and tests, have helped the growth and maintenance of interest, and now many steam utilities are engaged in this work in varying degrees. Managers of some companies appear to have adopted the doctrine in a whole-hearted fashion while others either are not convinced of its value or do not feel justified in putting such efforts into use.

We may then say, in summing up, that the idea of "customer-service," as applied to the district-steam utility, while of comparatively recent origin, has had the advantage of excellent and intensive study by a committee for the past seven or eight years. During the time many data have been collected, some tests have been carried on, and suggestions of much value have been collated, published, and brought to the attention of customers.

Utility's Aim Is Ultimate Profit

Before further discussion of the background of this idea let us note the reasoning behind one or two other ideas closely allied to utilization work.

One is this: Managers object to utilization work on the ground that "the company is in this business to make money. I don't believe in this business of cutting down a customer's use of steam. We must sell our steam if we want to earn dividends." Truer words never were spoken than these. Steam must be sold—up to the capacity of the plant, if possible, The point which should be carefully noted is: utilization work does not cut down the *total* amount of steam which can be sold, it merely cuts down the amount sold to certain customers for specific uses. Steam not sold to one customer still is available for sale to some other or others. If the selling policy is aggressive, and if the advantages of district steam are properly advertised there is almost certain to be a customer ready to take steam which has been saved in reducing the consumption of other customers. Objection to utilization work on the ground of curtailed consumption, as a matter of company profit and loss, merely indicates that either the organization is not aggressive in its sales policy, or that the importance of customer reaction is not properly understood.

Relation of Rates to Utilization

Closely allied to this objection is the question of the relation between utilization work and the method of charging for steam, that is, rates. There obviously is a very close relationship between them. If a rate structure is scientifically designed, and administered in such a way that every customer in each class really pays the cost of his service, and if the scale is so arranged that variations in cost are paralleled by variations in income, then it is a matter of less concern as to what happens to consumption figures than if charges are proportional only. The growth of utilization work has served to bring this matter of rates forcefully to the front. A company which launches a definite program of utilization is practically compelled to analyze its position in the matter of rates if the resulting advantages of this work are to be mutual between the user and the utility. The effect of utilization work on rate systems is a matter of great present interest, of difficulty, and of much importance.

Utilization Efforts Stimulate Utility Activities

Another point, seldom referred to, regarding this idea of helping a customer to keep down his bills, is that, while it introduces new problems in management, it also opens up new possibilities. We have noted that the adoption of customer service helped to promote the growth of the electrical industry. This same practice undoubtedly has great possibilities when applied to district heating. Here also it may lead to developments yet unheard of. Nothing so helps to keep the personnel of an organization pepped up and on its toes as do problems to be solved and difficulties to be met. Lack of problems, set ideas, and fixed and pre-conceived methods, always are a mark of stagnation. An organization beset with problems and with opportunities staring it in the face is one that is likely to rise

to the heights of accomplishment. Heat-utilization work appears to offer the very thing that is needed to produce problems, and pep, in district steam organizations. Better methods with customers scarcely can fail to develop good feeling, confidence, and appreciation on the part of the customer. These certainly will lead to increased demands and to a willingness to pay a "service" price rather than a "commodity" price. If accompanied by intelligent rates and good management on the part of the utilities it will not fail to open up opportunities. We may look forward to the day when the production and distribution divisions of the business are hard put to develop methods and apparatus to keep at least one jump ahead of the progress made by the utilization division in building up good will and demand for service. Utilization work, in the hands of a master manager, can become a powerful tool for building up a live, fighting organization.

District Steam as a Competitive Form of Heating Service

A further point has to do with competition with other forms of heating. District steam has held its place, and has been looked upon with favor, largely because of its ability to produce satisfactory results with no smoke or dirt within the building, with a minimum of attendance and attention and at a cost considered reasonable when these advantages were taken into account. For some years district steam occupied the unique and enviable position of being almost the only available form of heating which carried these advantages with it. In recent years the use of manufactured gas and of oil for heating purposes has received much attention. Either of these methods possesses many of the virtues claimed for district steam. Both are fairly free from smoke, dirt and attendance, basically. In the case of gas, at least, the overall efficiency between the fuel source and the user is much the same as with district steam. Prices vary greatly, but as yet district steam usually is cheaper than gas. It may or may not be cheaper than oil depending largely on locality. A chart published in THE HEATING AND VENTILATING MAGAZINE* gives a good idea of this. If these other forms of heating are further developed it will become increasingly difficult for district steam to hold its place except as it is able to render something of greater value than do the others. As the differences in price become less and less, it would appear that service, and maintenance of service, should become increasingly a valuable factor in assisting to meet this competition. The logical place for this new competition to strike first will be in new buildings. The owners of these buildings will be more readily converted to the use of district steam if the local utility has a reputation for rendering good service. The time to build up such a reputation is *before* the crisis is at hand, not afterward.

*Chart on Graphic Representation of Amount of Utilizable B.T.U. Purchased for One Dollar, published on Page 63, January, 1927.

It should then be evident that utilization work is not only of great basic importance but that now is the time to enter actively into it as it appears that it will become of greater and greater importance in the future.

Summary

We now are in a position to summarize:

1. The principle behind utilization work is service to the customer. Experience in this field indicates that acceptance of this principle as a necessary part of the work of utility companies is inevitable. So generally is the broad principle accepted that questions arising are largely those of policy, of extent, and of methods.

2. Acceptance of the principle does not imply acceptance of any method or series of methods. These will, of necessity, vary with local conditions, and with the viewpoint of local companies. Attempts to lay down detailed methods are of doubtful value except in a particular community.

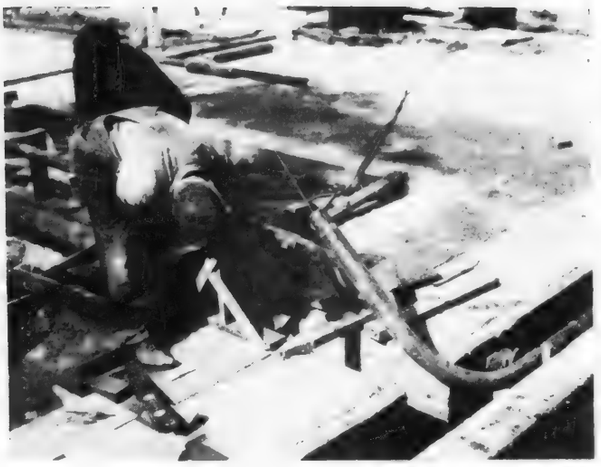
3. District steam has had the advantage of having a committee working on this problem for seven or eight years. Partly as a result of the activities of this committee many district steam utilities now are embarked on programs of utilization work of varying degrees. Many data have been collected and are available for use. This collected knowledge —largely dealing with methods—has been given widespread circulation.

4. Resting upon the foundation of service, the work of utilization is of both present and future importance because of its effects on the steam consumption of individual customers, and on the total steam generation of companies and systems. It should become an increasingly powerful force in building up customer good-will and support. It acts to redistribute the load on distribution lines to some extent, and affects the peaks, but to just what extent is a matter to be determined. It is likely to exert a profound effect upon the methods of charging for steam service. It may be made the tool and the inspiration necessary to put organizations on their toes, and to give them new life by creating problems of absorbing interest while at the same time creating the demand for service which will provide the organization with financial returns sufficient to reward the personnel for these increased efforts. It may become a very powerful force in combating competition with other forms of heating.

5. Utilization work while lagging behind production and distribution in point of time is very likely to become of at least as great importance in the success of the whole as are the other two.

We thus have noted something of the background, the present problems, and the future importance of heat utilization work. Let us now give some attention to the general methods possible, as a preliminary to studying some of the methods actually in use.

(*To be continued*)



Cutting Heating Pipes with Oxy-Acetylene

Welding *for the Heating Contractor*

Advantages and Disadvantages of Electric and Oxy-Acetylene Methods

By Horace E. Wetzell

THE art of welding steel has been in use for many years. One of the earlier methods was known as the forge-weld. The corner blacksmith was the greatest user, and many are the wagon rims that have been welded under his hammer. The smith hammers the ends of the bars to be welded into a wedge-like form, heats them white hot and, just as they begin to soften, covers them with borax or some other flux to prevent the formation of oxide. The hot ends are then laid together and hammered; the soft surfaces unite, and the joint formed is usually as strong as any other portion of the bar. Even though this is the simplest method of welding, it cannot be used by the piping contractor to join pipe.

Oxy-Acetylene Welding

The oxy-acetylene process of welding is by far the most common among pipe fabricators for the shop as well as for the field. Oxy-acetylene welds are accomplished by using a torch flame to heat to the melting point the metals to be joined. Usually some new metal is added from a filler rod which is melted at the same time and flowed together with the fused metal of the two edges of the joint. A high-temperature flame (6300° F.) is produced at the tip of the torch by the combustion of acetylene gas with oxygen gas. Compressed oxygen is supplied in cylinders, and acetylene is taken either directly from a generator or from cylinders. This flame must be watched very carefully so that a neutral flame is constantly produced which will have an excess of neither oxygen nor acetylene. Excess ogygen will produce an oxidizing flame which causes the metal to spark, and a foam or scum forms on the surface of the metal. The weld is shiny and, because it contains oxidized metal, has little strength. Excess of acetylene will produce a carbonizing flame. The excess carbon combines with the molten metal and the metal boils and has a cloudy appearance. The surface of the weld is mottled or pitted and the weld is brittle.

Oxy-acetylene welds properly produced are very compact and strong, with good ductility. With high-grade materials and good operators, high-class work can be obtained. Operators can be trained in a comparatively short time for average work. One torch operating over an eight-hour period will consume approximately one tank of oxygen containing 220 cu. ft. of free gas, and one tank of acetylene containing 300 cu. ft. of free gas. On extensive work, the problem presents itself of handling the large number of tanks required.

Cutting of Metals

The oxy-acetylene process also can be used to cut metals, especially iron, mild steel, and steels of low carbon-content. In pipe fabrication, regardless of the method of welding used, the oxy-acetylene cutting is indispensable because practically all joints require some cutting, trimming or scarfing. In cutting with this method the same combination of gases is used, but a different type of torch is required. The principle of the cutting torch in itself

is quite simple. The process consists in rapidly oxidizing the metal and blowing out the oxide from the cut. The metal first is heated locally, and then a jet of pure oxygen, traveling at a high velocity, is directed at the preheated metal in such a manner that the iron is melted, due to the burning of the iron in the stream of oxygen, the oxide freeing itself readily and dropping away. The slag that clings to the metal can easily be knocked off, leaving a very clean cut.

A different technique is followed in cutting cast iron. The process is based on melting the metal rather than burning. In cutting cast iron, the heating flame must be adjusted with an excess of acetylene; the blowpipe nozzle must be held farther away from the metal; longer preheating is necessary, as cast iron must be almost molten before a cut will start; and the blowpipe nozzle must be oscillated continually across the line of cut.

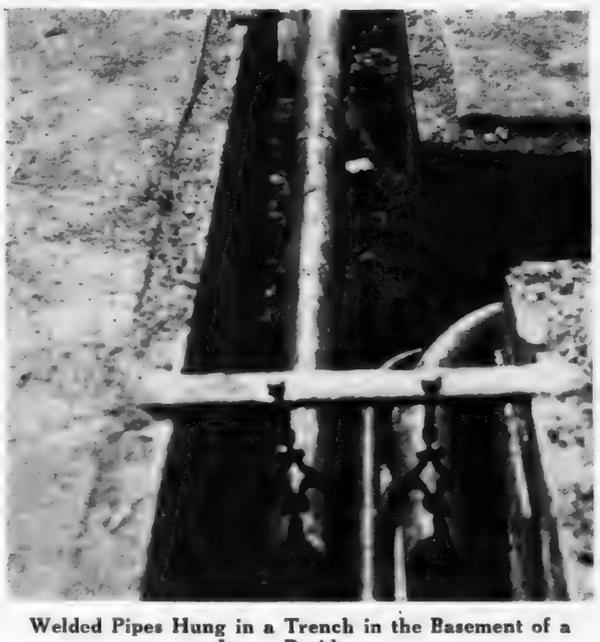
Electric-Arc Welding

Another important method of welding is through the use of the electric arc; either direct or alternating current can be used. In direct current welding, the work is connected to the positive side of the welding generator. In metallic welding the filling rod becomes the negative, while in carbon-electrode welding the carbon becomes the negative. Since the greater part of the heat is produced at the positive electrode, a puddle of metal is kept on the piece being welded so that molten metal from the metallic electrode will be received on the piece at a point where the metal is molten. The metallic-electrode method should produce good fusion between the metals to be welded and the new deposited metal. In the carbon electrode method the heat is produced by the arc between the work and the carbon electrode, and the filler metal is added the same as in oxy-acetylene welding. If the operator becomes a bit careless, or lacks experience, he is likely to fail to produce good fusion continuously through feeding in the new metal too rapidly. As a result, the new metal will flow over portions of the work which have not been brought to the fusing state. For this reason, the metallic welding produces better average welds.

In using alternating current, either terminal of the machine may be connected to the work. There are several advantages in using alternating current instead of direct current. The first cost of equipment is lower, as especially designed transformers for welding are cheaper than equivalent direct-current generators. Due to the wide-spread use of alternating current for power, this current is more generally available than direct-current. Alternating current transformers, properly designed, approximate constant-energy output automatically, without moving parts. The alternating-current transformer has much higher efficiency than any direct-current type of apparatus. The cost of maintenance of a transformer is low. Also transformers are comparatively light as compared to direct-current generator sets and are portable and rugged.

Offsetting these advantages, even with the best of welding transformers it is almost impossible to make satisfactory over-head welds with bare electrodes. Coated and covered electrodes do not entirely eliminate this disadvantage. The power factor of a welding transformer is very low—under welding conditions in the neighborhood of 20% to 35%. Also the danger of serious electric shock is present to a greater extent when using transformers than when direct-current generators are employed. It is due to these serious disadvantages that direct-current for welding is so widely used.

Lighter Pipes Can Be Used Where Joints Are Welded



Welded Pipes Hung in a Trench in the Basement of a Large Residence

A Strong, Permanently Leakproof Joint

To produce the potential for direct-current welding it is more desirable to use a machine of the motor-generator type than of the resistance type. By using a motor-generator machine, a welding current of low voltage and high amperage can be obtained from high-voltage, low-amperage supply. Such current is usually available and, due to the low amperage, comparatively small cables can be used. When using the resistance method, the welding current of low-voltage and high-amperage must be obtained from high-voltage and high-amperage current and all the energy lost due to the voltage drop through the resistance is dissipated as heat. This means excessive power costs and heavier cable. Also, in generating direct-current for welding, the motor-generator can be driven by either alternating or direct-current, while the resistance welder would require a direct-current source of supply.

Welds produced through the use of the electric arc are, in every way, satisfactory. There is a greater possibility of having porous welds if care is not constantly exercised than with the oxy-acetylene method. In the gas weld the added metal is in a molten condition for a longer time, which allows the entrained gases to rise to the surface and free themselves to the air. In the case of the electric weld, the metal would have set before the gases could be freed. By choosing the proper amperage for the work, this condition can be reduced to a minimum.

Pipe Fabrication

In pipe fabrication work in buildings, electric-arc welding has many advantages over oxy-acetylene welding. Both processes can produce good welds. Electric operations are faster and where the welding time is a large percentage of the total time (including preparing weld, aligning, tacking, etc.) the saving in cost is appreciable. Electric welding can be used to weld comparatively light materials to heavy masses. For example, light friction-hangers and pipe supports can be welded directly to enormous structural girders and beams. With the oxy-acetylene method the heat of the mass could never be brought up to the required temperature for fusion. Also, due to the heat being so concentrated in electric welding, faced-steel flanges can be welded to pipe without fear of warpage. In building construction, I have found it much more convenient to locate an electric-welding machine in one place in the building during welding operations and to string cables from this point than to carry the necessary oxygen and acetylene tanks to the location. By using the proper size of cable and of welding machine, welding can be accomplished without excessive loss at a distance of 250 to 300 ft. from the machine. Even though the work is to be electrically welded, all cutting should be performed by the oxy-acetylene process as the cutting of metals with the carbon electrode is still unsatisfactory.

In my opinion, where electric current is available and the welding time far exceeds the cutting and trimming time, it is desirable to use the electric-arc method of welding for such pipe work as is found in the average building. When the cutting and trimming time is equal to or exceeds the welding time, even though current is available, the gas weld should be used. Where current is not available, it is desirable to use the gas weld rather than to produce electricity by means of a gasoline-engine-driven generator. A gasoline engine requires considerable attention. It must be filled periodically with water, gasoline, and oil. In cold weather, the radiator must be drained each night and refilled in the morning. There is also difficulty in starting a cold gasoline engine. When welding current is desired, the governor speeds up the gasoline engine. A time elapses in bringing the engine up to speed, and, during this time, metal is deposited (using metallic-arc welding) that is not properly fused to the base metal.

Electric welding is used in a variety of different ways in addition to those mentioned. Machines have been built for spot welding, butt welding, line welding, and percussion welding. Except for butt welding these are of little interest to the heating contractor.

The Flash Method of Butt Welding

In making this weld, the parts to be welded are placed in a machine, the ends projecting the same distance from the face of the dies. After the parts are clamped in position, the current is turned on and the parts separated a little. This causes an arc to take place between the ends which burns off the excess material. In order to maintain this arc, one piece must approach the other slowly and at a very steady rate of speed, until the ends have reached a welding temperature. The parts are then rapidly brought together under a heavy pressure, at the same time turning off the current, completing the weld. In this method the heat is caused by the arc and not by the resistance of the current. Care must be exercised to see that a clean even contact is secured between the two pieces. Also production must not be rushed so rapidly that sufficient time is not allowed to bring the pieces up to a welding temperature. Machines are now made so that pipe

can be butt welded in this fashion from ¾ in. in diameter up to and including 8 in. in diameter.

Uses Recommended for Various Processes

To summarize the uses to which the various processes can be adapted, I would recommend the following:

Forge-weld, can not be used handily for pipe work.

Oxy-acetylene weld, should be used where electric current is not available, where cutting and trimming time exceeds welding time, and on small jobs where it is not worth the while to connect an electric welding machine.

Direct-current metallic-electrode arc weld, use wherever current is available, and size of job justifies connecting the machine.

Direct-current carbon-electrode arc weld, use metallic-electrode method instead as it is more convenient.

Alternating-current welding, does not adapt itself for pipe work.

Butt-weld-machine, to be used in quantity production of line welds.

Atomic-hydrogen arc-weld is not adapted to field pipe-welding but is ideal for shop welding of dissimilar metals.

Thermit-weld can be used where only butt-welds are desired, if good welders and other welding equipment cannot be procured.

(*To be continued*)

District Heating School Studies Welding

IN a lecture before the district heating school at Purdue University, Prof. J. D. Hoffman brought out some interesting points about welding, among them being the statement that the riveted joint is fast disappearing, even in framed structures. Excerpts from his lecture follow:

"Most welding is done on rolled stock, iron and steel. Rolled stock usually has a fibrous structure, due to rolling and hammering, and possesses a tensional and flexural strength not found in the original cast piece. Welds are the result of fusion, and as such are wholly crystalline. This welded section, therefore, is of a different structure than the wrought stock, and for equal sectional areas may be weaker than the wrought stock. Since welded stock is to be regarded as a fusion proposition, it depends upon the man who does the welding whether the job is satisfactory or not. If he is a man who knows his job he will probably make it one hundred per cent strong. A poor workman, however, may injure the stock around the weld and reduce the strength below the normal strength of the stock. Any one who says to you a welded joint is as strong as the plate, is doing it without making the qualifying statements he ought to make. The welder himself is about nine-tenths of the battle in that case.

"One important phase of the welding business is the underground construction. Some of you may be welding your pipe joints and fittings and probably have been well satisfied with the results. Cutting threads on pipe takes more time than welding and certainly reduces the strength of the pipe much more than is found in a good weld.

"In our work on underground construction at Purdue University the last two summers, the bids were made in two ways: Options were given between screwed joints and welded joints. The welded joint was selected because we believed it would be fully as satisfactory in use and because it was much cheaper.

"The field for welding is just beginning to open up. The riveted joint is fast disappearing from ordinary service, and even framed structures are beginning to feel the effect. In this latter service there is considerable reluctance as yet to make the change. In central Ohio, there are some structural buildings being built without rivets, but people as yet are not ready to trust the man who welds the two pieces together.

Practical Hints on Welding

"There are three methods used in welding: the oxy-acetylene method; the arc method, both carbon and metallic arc; and the hydrogen-arc method. The last method named is a process of welding which is now in the experimental stage.

"There are several types of oxy-acetylene welding outfits which use the gases oxygen and acetylene. Some are known as the equal power type and some are known as the unequal, or the injector type. Either type of outfit will make a very good weld. Regarding the two gases, acetylene is a high percentage carbon gas which produces the highest flame temperature known. It is an unstable gas and cannot be pumped into the tank under very high pressure because too high pressure will cause it to explode. They usually charge it to a pressure of 15 lbs. per sq. in.

"Oxygen is an invisible gas, has no odor, and only assists other gases in producing a hot flame. It is furnished to the user in steel bottles under high pressure. Oxygen is bottled for common use, in two sizes of bottles, of 190 and 200 cu. ft. capacity. A number of manufacturers increase the amount in the 200 cu. ft. size to 230 cu. ft. which increases the pressure from 1200 to about 2000 lbs. per sq. in. This high pressure is one feature in connection with the use of oxygen that may be considered dangerous. Also, oxygen explodes violently in contact with oil and grease, and operators have been injured by not taking the proper precautions. When taking off or connecting the regulator be careful not to touch it with oily waste. This accident almost always occurs when the tank is empty. Such explosions almost always blow the regulator into the operator's face. The operator should be careful not to allow the tank to fall on the hard surface and break off the valve."

Heating and Ventilation Specifications

Part VII—Payments, Statements of Costs, Samples and Changes in Materials, Guarantees

By Harold L. Alt

As payments are one of the most important factors of the contract both to Owner and Contractor, the Engineer and Architect should exercise particular care to protect the Contractor from underpayments and to insure the Owner against overpayments. When a Contractor is fully bonded the matter of slight overpayment does not assume the importance nor does it contain the element of risk for the Owner which occurs in an unbonded contract.

In an unbonded contract, sufficient funds are presupposed to be retained by the Owner so that, if at any time during the progress of the contract, the Contractor should be prevented from finishing the work, then the Owner will have sufficient funds left to complete the contract *without exceeding* the original contract price. With a bonding company back of the Contractor it, of course, devolves on the bonding company to finish the contract at no additional cost to the Owner.

It will be a great aid both to the Contractor and the Engineer or Architect to have an apportionment schedule arranged so that an intelligent financial survey can be made at the time of issuing each certificate of payment. Such a schedule does much to overcome the common tendency to reduce the Contractor's payments to a ridiculously small figure, simply because the man issuing the certificate is unable to determine accurately just what proportion of the entire contract has been carried out.

As is usually done, the Contractor goes over his estimate sheets and makes a summary thereof. This he presents to the Engineer or Architect as a list to be used for determining amounts due. This list might be arranged as shown in next column.

This suggestion is covered in GC-25 which reads:

> GC-25 STATEMENT OF COSTS:
>
> The Contractor, when required, shall furnish for the confidential use of the Engineer (or Architect), upon a blank form provided or approved, a correct statement showing the estimated cost of each part of the work as sub-divided in the specifications, the total equaling the contract price. This is to be used for the purpose of subsequent alterations should such be found desirable, and for checking payments for work performed and material delivered.

This idea has not been incorporated in Specifications Nos. 1 and 2. In Specification No. 3, however, the following clause appears:

STATEMENT OF COSTS:

For the purpose of expediting estimates for the issuance of certificates of payment, the contractor shall, upon request from the Commissioner, furnish a true statement of the cost of each subdivision, as given in these specifications.

Specification No. 4 does not cover this suggestion unless it is included in the Architect's General Conditions to which the Contractor is referred.

Portion of Work	Material	Labor
Boilers		
Radiators		
Piping		
Radiators and valves		
Covering		
Pump		
Smoke breeching		
Sheet-metal ducts		
Fans		
Air washers		
Heaters		
Grilles		
Motors		
Miscellaneous		
Total	$	$
Total of Contract	$	

Specification No. 5 says:

SCHEDULE OF COSTS:

In addition to GC-25, the Contractor also shall file with the Superintendent an itemized statement of the work, giving in each case the costs.

Specification No. 6 includes the following:

PRICE SCHEDULE:

Before signing the contract, the Contractor shall file with the Engineers a full and completely itemized schedule of the different materials and workmanship covered by the proposal, giving quantities and prices of the materials and labor complete in the building. The complete schedule shall include everything required in the execution of the contract and the total must be equal to the amount of the contract price.

It also is the practice in some cases to call for samples of materials to be submitted which are representative of the materials which the Contractor expects to furnish on the job. When such are required the paragraph GC-26 may be used.

GC-26 SAMPLES:

The Contractor shall provide, when required, for the approval of the Engineer (or Architect) satisfactory evidence to show the kind and quality of materials which are to be used, and shall furnish duplicate labeled samples of materials and workmanship, with all required information, and the materials furnished for this work shall have the same character and finish as the approved samples.

Specification No. 1 does not call for samples, and Specification No. 2 covers this subject as follows:

LIST OF EQUIPMENT:

Before proceeding with the work, this contractor shall submit to the Consulting Engineers for their approval, a written statement in triplicate giving the makes and grades of all materials, such as pipe, pipe covering, valves of all types, radiators, registers, etc., as well as all apparatus which he proposes to furnish and, if approved, he shall use no other make without first notifying the Consulting Engineers in writing and obtaining their approval. If requested he shall furnish samples of such materials to be retained by the Consulting Engineers until the job is completed.

Specifications Nos. 3 and 4 do not mention the subject, but Specification No. 5 is very elaborate:

SAMPLES:

(a) The Contractor shall furnish for approval, all samples required as hereinafter specified; also in all cases where material and quality are not definitely specified, samples or specimens shall be submitted to the Superintendent for approval. The work shall be in accordance with approved samples.

(b) To insure prompt consideration of samples, a letter, mailed on the date of shipment, shall contain a list of samples that have been forwarded, together with the brand and the name of the manufacturer of the materials. This letter must not be sent in the same package with the samples. Any sample received in advance of such letter will be held two weeks; if at the expiration of that period no identifying letter has been received, the package will be given no consideration and will be discarded.

(c) All samples must be carefully packed to insure delivery in good condition. Each sample must have a label showing the material represented, the name of the Contractor, the name of the manufacturer of the material, and the name or number of the school and its location, for which sample is intended.

(d) The approval of the samples is for quality, finish and general construction, and does not modify the requirements of the specification or drawings as to dimension or design.

(e) Samples shall be submitted in duplicate, one for the Superintendent's office files and one for forwarding to the building. Should the Contractor desire an approved sample for his files, he shall submit samples in triplicate and shall call at the office of the Superintendent to obtain the approved sample.

Specification No. 6 says:

SUBMITTANCE OF SAMPLES:

The contractor must submit for the approval of the Engineers all the samples hereinafter required and any which are subsequently called for by the Engineers and until such approval has been obtained must not install in the building any material or appliance required to be so approved.

Each sample must be marked with the name of the building to which it relates, and the name of the contractor; and an article previously approved by manufacturer's name, also must have the latter marked thereon.

Approved samples will be sent direct from the Engineer to the Superintendent of construction at the building, who will allow them to be used in the work when they have served their purpose as samples, with the understanding that they must properly be marked for identification at time of final inspection.

Rejected samples of value will be returned by the Engineers to the Contractor unless at times of submission they have requested some other disposition to be made of them.

In order to receive attention, samples forwarded must be accompanied by a letter of advice from the Contractor.

All shipping charges on samples sent to the Engineers must be prepaid by the Contractor. Rejected samples will be returned "collect."

No samples of any description in connection with the mechanical equipment are to be submitted to the Engineer unless specifically called for by him or required by specification.

Naturally one of the important things for a specification to guard against is *substitution*. A specification calls for material or equipment of a certain character and equipment or material of the character specified should be furnished. Unless this rigidly is adhered to there is no fairness between the Contractors who tender. The honest contractor who figures on the material and equipment specified is hopelessly out of the running when the "substitution" man gets his price in.

In GC-27 this is taken care of in a very diplomatic manner and delicately conveys the information to the "price cutter" that, if he is allowed any deviation from the materials or equipment called for, it will only be on the condition that *all* bidders shall have the same privilege.

Specification No. 1 does not mention this subject and Specification No. 2 refers to the general conditions of the General Contract. Specification No. 3 says:

GC-27 CHANGES OF MATERIALS:

No change in the character or make of material specified herein will be permitted at any time after the proposals are received. Bidders wishing changes must make a written application to the Engineer (or Architect) at least five days prior to the time of the closing of bids, and if such changes are approved by the Engineer (or Architect) each Contractor bidding upon the work will be so notified.

The Contractor, shall, if requested, produce for inspection, vouchers showing the quality of the material furnished.

SPECIFICATION AND SUBSTITUTION OF EQUIPMENT:

All work, materials, fixtures and apparatus shall be first-class in every respect, all shall be equal, in the opinion of the Commissioner, to those specified and all shall be delivered upon the completion of the building in a perfect and undamaged condition, without exception.

Where these specifications call for specific materials, fixtures or apparatus, substitutes therefor may be used, provided such substitute is equal in the opinion of the Commissioner to the material, fixture or apparatus specified, and provided further, that such substitute shall have been submitted to and received the written approval of the commissioner not less than three days previous to the opening of bids, as no substitution will be permitted afterwards. Such written permission shall apply specifically to this work.

Specification No. 4 is rather lenient on this subject and encourages alternate proposals on substitutes although the base price must be on the work, as specified.

SUBSTITUTIONS:

Certain definite makes of apparatus are specified as a minimum standard. The contractor shall make his basic bid on the understanding that he is to furnish the makes specified without substitutions. He is requested to bid on any other makes of apparatus he may prefer of equal or better quality, it being clearly understood, however, that the names of the alternate apparatus or materials shall be stated in the bid, together with the difference in price, if any. If it shall then be decided by the owner to accept such substitution, the specifications will be amended prior to the award or signing of the written contract. If such alternates are not accepted, the contractor shall furnish the materials specified. Where several makes of apparatus are mentioned and the contractor fails to say in his bid that he prefers any particular apparatus, the owner shall have the right to choose any of the makes mentioned without change in price. Refer to Article 3, of General Conditions.

Specification No. 5 treats on this at length, and as it covers public work, no patented articles or materials can be exclusively specified. It states:

STANDARDS OF EQUIPMENT:

Whenever any article or class of materials is specified by the trade name or the name of any particular patentee, manufacturer or dealer, or by reference to the catalog of any such manufacturer or dealer, it shall be taken as intending to mean and specify the articles or materials described or any other equal thereto in quality, finish and durability, and equally as serviceable for the purposes for which it is or they are intended, as may be judged and determined by the Superintendent. Nothing in these specifications shall be interpreted or taken to violate the provisions of Section 1554 of the Greater New York Charter, which provides that "except for repairs, no patented pavement shall be laid, and no patented article shall be advertised for, contracted for or purchased, except under such circumstances that there can be a fair and reasonable opportunity for competition, the condition to secure which shall be prescribed by the Board of Estimate and Apportionment."

If the Contractor shall submit and the Superintendent shall approve any articles or materials as equal in quality, finish and durability, and equally as serviceable for the purpose for which any article or any class of materials, specified by a trade name, or by the name of any particular patentee, manufacturer or dealer, or by reference to the catalogue of any manufacturer or dealer, are called for in specifications, the Contractor hereby agrees to repair at his own expense any defects which may develop in the article or material substituted, at any time within two years after the completion of the entire work called for by the contract. No extension of time will be allowed for the time lost in consideration of any material sought to be substituted by the Contractor.

In Specification No. 6 no substitutes are permitted:

KIND AND QUALITY OF MATERIAL:

All material, appliances, and fixtures furnished must be in strict accordance with the specification requirements in each case and of best quality and grade.

Bidders must furnish on the proposal sheet the information required thereby as to the name and address of manufacturer of equipment they propose to supply.

Every contractor is expected to have faith in his own work even if the Owner and Engineer or Architect are born pessimists. For this reason the Contractor is almost invariably required to guarantee his work. Guarantees run from one to five years, the average probably being two years. As matters usually go it will be found difficult to get any contractor (regardless of the length of time for which he has guaranteed the work) to do much repairing after the first twelve months.

There are too many alibis to be offered such as "natural wear and tear," "expiration of the manufacturer's guarantee," "improper use," "failure to give proper attention," and so on, *ad infinitum*. Consequently a one-year guarantee usually will mean just as much to the Owner as a five-year term, and GC-28 is so written:

GC-28 GUARANTEE:

This Contractor shall furnish a guarantee covering all labor and materials for a period of one year from date of final acceptance of his work, which shall include an agreement to repair and make good at his expense any and all defects which may appear in his work or materials during that time, which, in the judgment of the Engineer (or Architect) arise from defective workmanship, imperfect or inferior materials.

This Contractor shall also secure and deliver to the Engineer (or Architect), from the manufacturers of all apparatus furnished for this building, a guarantee covering all flaws and defects in the manufacture of materials, which guarantee shall provide that said manufacturer will furnish free of cost all replacements and repairs except those made necessary through ordinary wear and tear, for a period of two years.

The second paragraph of GC-28 is not always insisted on but it is a good thing to have in case outside influences are brought to bear in an effort to force in some particular make which is unknown or has still to acquire a reputation for permanence.

Specification No. 1 also is based on a one-year period:

PAYMENT FOR FAULTY MATERIALS:

The payment of any portion of the work on the contract or extra orders shall not involve the acceptance of any work, nor shall it relieve the contractor of responsibility for negligence or faulty materials or workmanship. Upon written notice from the Owner, the Contractor shall remedy any defects due thereto and pay for any damage to other work resulting therefrom within a period of one calendar year from the date of the final payment, except in such cases where the terms of the guarantee are especially increased as hereinafter specified in the various sections of the specifications.

(In addition to this, the Heating and Ventilating Sub-Contractor is required to meet the following special guarantee.)

The Heating and Ventilating Contractor shall guarantee all labor and materials for a period of one year from date of completion and final acceptance of his work by the Owner, which shall include an agreement to repair and make good at his expense any and all defects which may appear in his work or materials during that time, which, in the judgment of the Architects, arise from defective workmanship, imperfect or inferior materials.

Where special guarantees, covering installation, operation or performance of any systems or appliances furnished under this contract are herein required, the full responsibility for the fulfilment of such guarantees must be assumed by the Heating and Ventilating Contractor, who shall obtain written guarantees in triplicate from any and all sub-contractors, two copies of which shall be filed with the Architects before final acceptance.

Specification No. 2 very briefly calls for a two-year guarantee, in which the Contractor is required to furnish a written guarantee to make good any defects of material or workmanship developing within two years from completion.

In Specification No. 3 no guarantee is asked for, this being covered in the form provided when signing the contract. Specification No. 4 says:

GUARANTEES:

The contractor shall make good the following requirements: All apparatus shall be free from defects of material or workmanship. All apparatus shall be so built and installed as to deliver its full rated capacity at the full efficiency for which it was designed.

Steam and condensation shall circulate throughout the apparatus without objectionable noise at not over 1 lb. pressure at the reducing valve, and all parts of the heating surface, blast and direct, shall be heated under this condition. Fresh air shall be delivered at the inlets to the room simultaneously, in amount equal to or in excess of the volume called for in the schedule. Air shall be exhausted by the mechanical exhaust system, at the outlets from the rooms in amounts equal to or in excess of the volume called for in the schedule.

The entire mechanical apparatus shall operate at capacity without objectionable noise.

Specification No. 5 carries a one-year warranty:

GUARANTEE:

There shall be executed and delivered to the Superintendent, before his signing of the certificate for the final payment, a written guarantee that all work of this contract is free from all defects, both as to workmanship and materials, and that should any defects, that cannot be proven to be due to improper use, develop within the space of one year from the date of completion of the work as certified by the Superintendent in his certificate for final payment, such defects shall promptly be made good, free of charge, to Board of Education.

Specification No. 6 likewise uses a one-year time clause:

BOND TO SUPPORT GUARANTEE:

The bond which will be required in connection with the contract must guarantee each and every part of the mechanical equipment for a period of one year from date of final acceptance unless otherwise hereinafter specified. The Contractor will be required to remedy at his own expense all defects which may develop by reason of any inferior or defective materials or workmanship.

(To be Continued)

PIPECRAFT

XIII—Underground Work

PIPECRAFT cannot be called complete without reference to the various methods of installing underground steam and return mains. Mains laid below grade are an expensive proposition for numerous reasons. In the first place if a pipe is simply placed in a trench and buried, the same as a gas, water or sewer line is treated, a great loss of heat from the pipe to the surrounding earth is bound to occur. If the ground is wet the result is practically a water-jacketed pipe with all the high rate of heat transmission inherent under such conditions.

As soon as insulation is applied to stop this high heat-loss, the problem becomes one of preserving the covering and keeping it dry. Such covering must be protected from being crushed and from ground water, for wet covering is almost as bad as wet earth against the pipe, and the action of water is detrimental to nearly every kind of covering so far produced.

Then, where underground mains are any considerable length, expansion and pipe movement must be taken into consideration as well as heat insulation. It is generally admitted that a covered pipe will expand a greater amount (more nearly the truly theoretical elongation) than uncovered pipe, because the surface of the uncovered pipe is cooled by the air, thus decreasing the expansion; while the covered pipe, where the surface is at practically the same temperature as the medium conveyed, is not so limited.

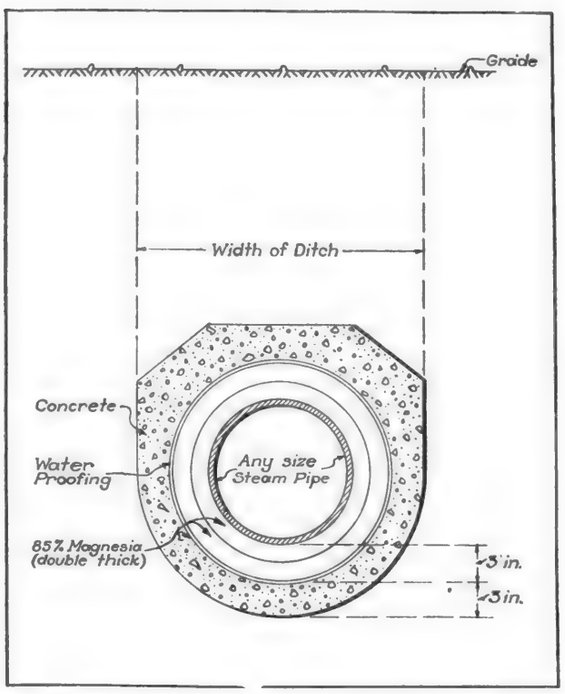


Fig. 1. Simple Method of Installing Underground Mains

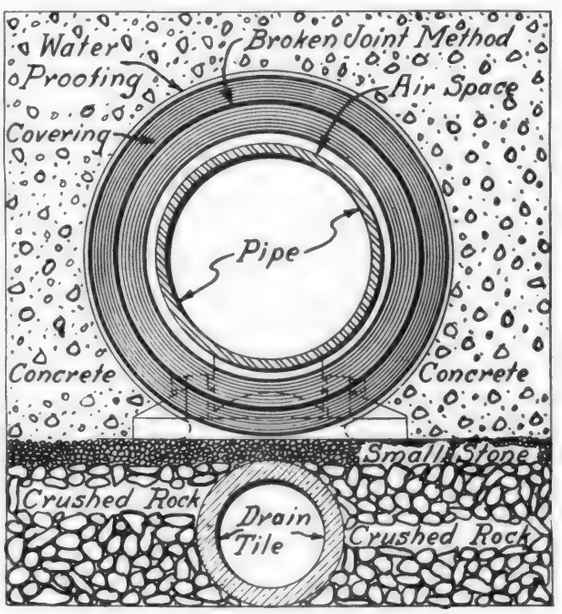


Fig. 2. Cross Section of Pipe in Conduit with Separate Drain Tile

Provision for expansion involves swing joints, loops, offsets or expansion joints. Expansion joints probably constitute the most popular method of solving the expansion difficulty and this is due in part to the cheapening of trench construction over what would be required for loops, offsets or swing joints.

One of the simplest methods of installing underground mains is shown in Fig. 1, this having been used in many districts with considerable success. The installation is made in the following manner:

A trench first is dug with a semi-circular bottom, the invert of which is made about 6 in. below the bottom of the proposed line; then the pipe is lowered into the trench, supported on wires fastened to pieces of timber which bridge the trench at frequent intervals. The lengths then are connected up and the pipe is leveled by shortening or lengthening the supporting wires.

Next a 1½-in. thickness of 85% magnesia covering is placed on the pipe, over which a second 1½-in. thickness of similar covering is placed with broken joints. The whole covering then is 3 in. thick; No. 18 gauge black steel wires on 6-in. cen-

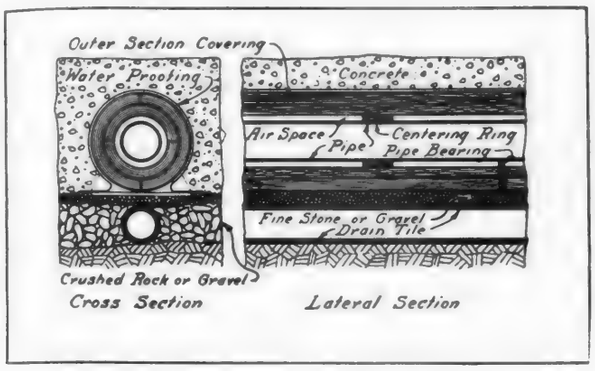


Fig. 3. Sectional Views of Broken Joint Method

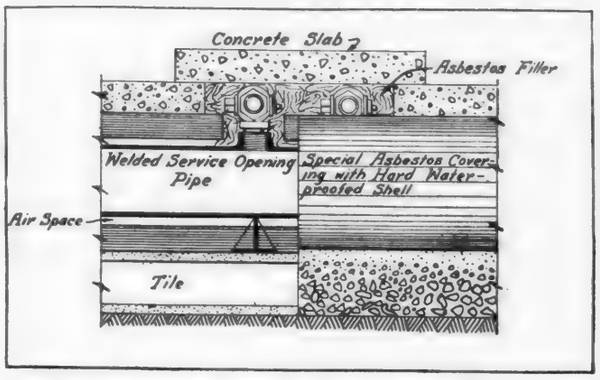


Fig. 8. Use of Monolithic Covering of Underground Pipe Line

ters are used to fasten the covering securely to the pipe.

Over the magnesia is placed a single thickness of 5-ply roofing with a 3-in. lap. This is fastened on with No. 16 B. and S. gauge copper wire on 6-in. centers. The whole outside of the covering then is given a coat of hot asphalt, particularly where the supporting wires leave the covering.

The trench now is filled with concrete to a depth 3 in. above the pipe, as shown. This is done by running a small portable concrete mixer along the top of the trench and pouring the concrete in between the timber supports. The concrete then is spaded and brought up to shape on the top, as shown.

After the concrete has set, the supporting wires are cut off at the top of the concrete and the wires and cross timbers removed. Then the trench is refilled and tamped. This scheme has the desirable factor of providing a first-class insulation, amply protected by a solid concrete wall and thoroughly waterproof. No underdrain has been found necessary where this construction has been used.

Use of Underdrain

Another method, somewhat similar to this, is shown in Fig. 2, but in this case an underdrain also is used. For this method a trench first is dug of sufficient depth to allow the tile underdrain to be laid in the bottom, with open joints and surrounded by broken stone. On top of the broken stone a layer of fine stone is spread, and on this the cast-iron bases for the pipe rollers are set and the pipe is put in position on the rollers.

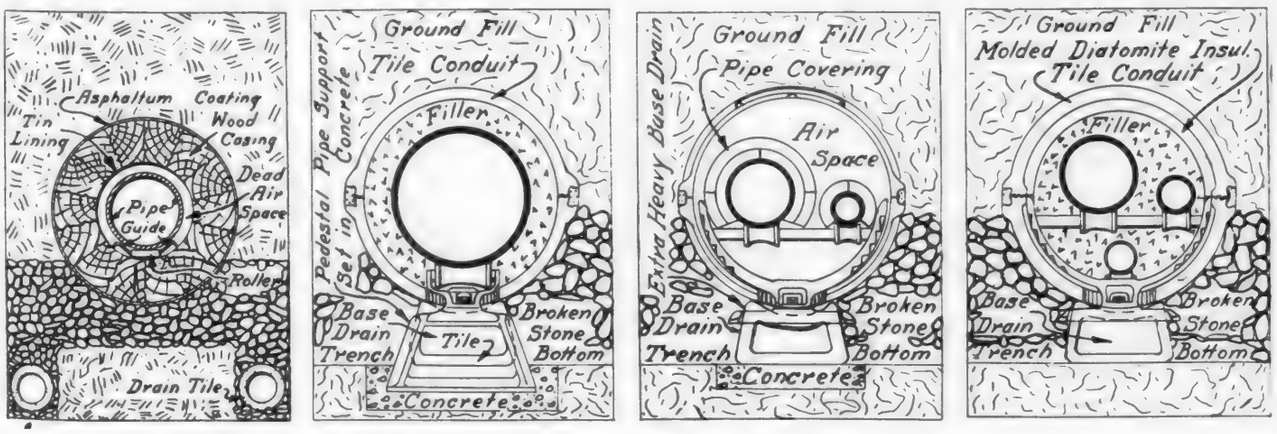
A covering sufficiently larger than the pipe to leave an air space is next placed on the pipe, being kept equi-distant from the pipe surface all around by the use of separators.

Around this first layer of covering is placed a second layer, with broken joints, and the two layers are wired on and covered with waterproof roofing. The whole then is buried in concrete for about 3 or 4 in. above the top of the pipe, and the trench is refilled. A longitudinal section of this type of construction is shown in Fig. 3.

Wooden Conduit Used in Dry Soil

Wooden pipe conduit also is used to a considerable extent, the life being about 20 years where ordinary dry ground conditions are encountered. Fig. 4 illustrates a typical wood conduit construction, the method of trenching being somewhat different from the previous. The trench is dug to a level a few inches below where the bottom of the covering will come, and gutters then are dug along the bottom of the trench on each side.

In these gutters drain tile, with open joints, are placed and a layer of broken stone is put in. Then



Figs. 4, 5, 6 and 7. Types of Underground Main Construction

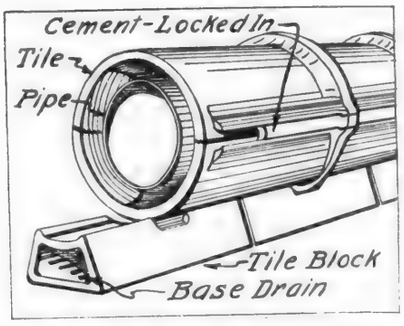


Fig. 9. Tile Drain with Special Lip to Hold Cement

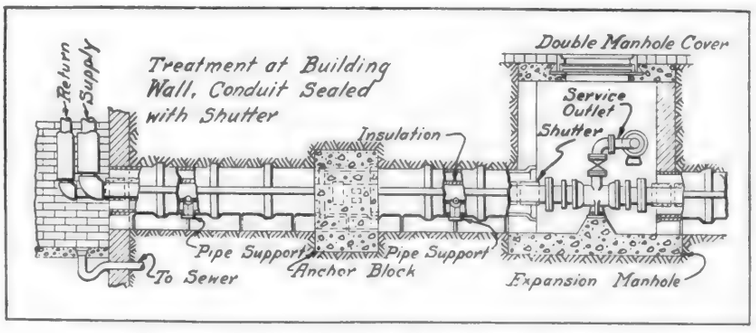


Fig. 10. Typical Anchor and Manhole Construction

the pipe is installed and the wood conduit placed over the pipe and covered with an asphaltum coating. More broken stone is shoveled in until the level is brought up sufficiently high to support the conduit; the pipe is carried on small rollers attached to brackets inside of the conduit. Then the trench is refilled and the job is complete. This type of conduit often is lined with bright tin to reflect the heat back to the pipe and thus prevent a portion of the heat from going through the walls.

A more elaborate method is shown in Fig. 5 where a tile conduit is used, set on tile base blocks which form the underdrain. These blocks are supported on a continuous concrete slab laid on the bottom of the trench. At various intervals cast-iron bearings, with pipe rollers, are used to support the pipe, and the space between the pipe and the tile is filled with some good type of insulation.

A similar conduit, arranged for double pipes, is shown in Fig. 6. Here no insulating filling is used but, instead, each pipe is insulated with a pipe covering, two layers being used on the steam line and one layer on the return line. Also the method of support provides separate rollers for each pipe.

A typical detail of a tile drain is shown in Fig. 7, this being arranged to accommodate three pipes. It is constructed in practically the same manner as the tile conduits previously described.

What is known as a monolithic covering is shown in Fig. 8. This scheme employs a special asbestos covering with a hard, waterproofed shell, and has a tile underdrain with broken stone on the top and at each side.

Yet another form of tile drain is illustrated in Fig. 9, this tile conduit having a special lip on each side to receive the cement mortar used for making the joint tight and so arranged as to permanently lock the mortar in the joint. Continuous tile supporting blocks form an underdrain for this type of conduit and anchors and supports can be arranged as shown in the typical detail in Fig. 10.

Service branches from the street mains usually are taken from the top, and with this system of conduit they can be arranged as shown on the typical scheme indicated in Fig. 11.

Installation and Inspection Vital in Gas-Fired Heating Jobs

THE importance of good installation practice cannot be over-emphasized. A boiler or furnace which shows a high efficiency under laboratory test may have that efficiency very much reduced by being subjected to too much, or too little draft, when installed for actual service. Adding $100 to the first cost of a given boiler might increase its efficiency 2%, but $2 spent in the form of intelligent inspection after the boiler is in service might increase its practical every-day efficiency 10%. In a vital analysis the laboratory efficiency of a gas-heating appliance is valuable only in so far as it indicates the possible efficiency when operating under practical every-day working conditions on the customer's premises. Laboratory tests, therefore, should be made as nearly as possible under conditions as they will exist after correct installations, and gas companies and manufacturers should unite to secure correct installations. A good boiler and good gas may be discredited by faulty installation.

I recently heard of a case where the installation

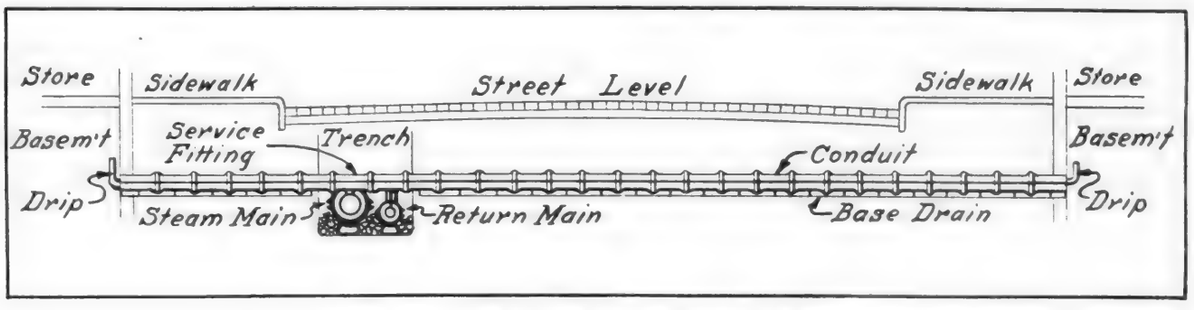


Fig. 11. Typical Method of Service Connection

of a damper in a flue line from a boiler saved $500 in a season's operation on a large installation. I once knew of a case where a good boiler properly installed was the source of general dissatisfaction and complaint of high consumption. The cause was discovered to be nine open fireplaces without dampers. Intelligent gas-company inspection found the trouble and it was easily corrected. Still more intelligent inspection would have forestalled the complaint, which would have saved time and money.

Consider the case of a customer who heats his home with gas, using 400,000 cu. ft. per season. An inspection service of $4 the first year and $2 each succeeding year will, during the life of his appliance, probably save an average of 5% of its consumption, which at 80c per thousand cubic feet is $16 per year. These routine calls would not cost more than $4 per year on the average. The total cost of good inspection, including routine calls and trouble calls for a company with a fair number of heating installations, is from 1c to 2c per thousand cubic feet of gas consumed for heating. On this basis the cost of giving this particular customer good service will average only $6 per year, which saves him $16 on the average. In some cases it might save him $32 or $48, which in every instance produces, as a by-product, satisfaction more valuable than the money saved. We must have competent inspection and we should let the public know that we are giving it.—*From an address by Thomson King, before the Fifth Annual New York Regional Sales Conference.*

London Theatres to be Heated to 55°!

LONDON theatres have been noted for being cold and draughty places in the winter, so much so that in many cases patrons were forced to wrap themselves in their overcoats in order to be comfortable enough to enjoy the show. Consequently, the latest order promulgated by the London county council will be of interest, not only to the theatre-going public, but to the heating and ventilating trades in Great Britain, for the new order requires that, in the coming winter, all theatres and cinemas in the jurisdiction of the council will have to be warmed. A minimum indoor temperature of 55° F. will have to be maintained when the outdoor temperature is 30° F., and the heating systems must be combined with some system of mechanical ventilation. Open fireplaces, electrical or gas appliances for heating certain parts of a building will not be allowed.

It has been the practice of the council to demand that all new buildings, as well as reconstructed ones, be equipped with efficient means of heating, so that the more modern theatres will not be affected by the recent ruling. There are, however, many of the older places of entertainment that have not fallen into line, and they now will have an unpleasant awakening.

Heating a Suburban Home with Gas

(*Continued from Page* 58)

When one considers that these people had all the inconvenience of coal delivery, dust, dirt, and the uncertainty of the furnace man's appearance, also the fact that the average hired furnace attendant will waste coal, it is evident that they paid well for their heating service.

After twelve years' experience in a frame house heated by a coal-fired boiler, the freedom from dust in the new home is very marked. Not only is the cellar clean, but the cleanliness due to the fuel used is noticeable throughout the entire house. While our periodical cleaning intervals perhaps are as numerous as formerly, they are merely a matter of household routine, and we notice that there is less dust and dirt, and each cleaning is accomplished with less labor than formerly.

Summary

It is evident, to me, from this experiment, that the success of gas-utilization as a national practice, largely is dependent upon the minimizing of heat losses by means of insulation and the reduction of infiltration losses through the use of high-class weatherstripping. While the use of insulation is spreading, and architects and heating engineers are beginning to recommend it, the growth of its application has not been in keeping with its merits, and every reasonable means should be taken to stimulate this development. Lack of knowledge of insulating materials and of the advantages of insulation among builders of groups of houses calls for education. Inasmuch as the development of gas heating and insulation are so intertwined, this should be the mutual function of the gas interests and insulation manufacturers.

It might not be amiss to suggest that the prospective owner, the builder, and the insulation man be brought together whenever there is a prospect for gas heating in a to-be-built home. The builder sells the house; he is anxious to please the owner, but is not biased in the matter of fuel or economy—he is neutral. The insulation man is not interested in the class of fuel used; his product will conserve heat produced by any kind of fuel; he is not trying to sell gas. The owner wants to be as comfortable as possible, have the least trouble, and be faced by a fuel bill as small as is possible. Usually he is not informed in the matters under discussion, but is open to conviction.

The builder sells the house and is finished with it.

The owner has to live in the house and be comfortable, or not, as may be.

The gas man's interest is maintained as long as the house stands, provided only that gas is selected as the fuel.

It would seem that the gas utility is the proper agent to bring together the interested parties.

The Heating & Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

MEMBER

National Publishers' Association
Associated Business Papers, Inc.
Audit Bureau of Circulations
Plumbing and Heating Industries Bureau
American Oil Burner Association

VOL. 25 October, 1928 No. 10

Published Monthly at New York, N. Y., by the
HEATING AND VENTILATING MAGAZINE COMPANY

Executive and Editorial Offices, 386 Fourth Ave., New York.

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Subscription	$2.00 per year
Canada	2.50 per year
Foreign Countries	3.00 per year
Back Numbers	50 cents each

THE publishers of THE HEATING AND VENTILATING MAGAZINE announce *Oil Heat*—a new monthly journal for the oil-heating industry, as well as for those in allied but overlapping fields. It will make its début November 1, and will be edited by P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE. *Oil Heat* will be devoted to the promotion of domestic, commercial and industrial phases of the industry. Its editorial policy has been planned to stabilize the industry, to guide it along sound lines, both commercial and technical and to help the oil-burner dealer through an interchange of sales and other methods which have proven successful. *Oil Heat* will take a fearless stand on any abuses which exist, or may crop up in the industry and will, at all times, be devoted to extending the use of oil fuel.

In reaching the decision to establish a journal representing the rapidly-growing oil-burning industry, the publishers were influenced by the fact that oil heating has many angles outside the scope of THE HEATING AND VENTILATING MAGAZINE. At the same time, THE HEATING AND VENTILATING MAGAZINE takes what we hope is a pardonable pride in the part it has played in the evolution of this lusty young industry from its infancy.

NOW that oil heating has passed through its probationary period, it may be stated that our editorial policy has not always had the entire endorsement of the heating and ventilating industry. More than once the prediction was made by members of the heating fraternity that oil heating was destined to run its course and eventually to pass out of the picture. And, indeed, there were many good reasons to support this view. The mere novelty of the method, for one thing, gave pause to the more conservative heating men. Difficulties experienced with the earlier types of burners also were an important factor. These, coupled with some of the marketing methods which it was thought necessary to employ, created a feeling of distrust, which even now has not entirely disappeared. But, even if these causes had not been present, the fact that oil burning involves mechanical and electrical parts (consequently the need of servicing) was sufficient to place it outside the ordinary routine of the heating man. Previous to the introduction of oil burners, a heating plant, once it was installed and put in operation, was considered a finished job and not subject to further attention on the part of the contractor.

At the same time, heating men realized from the first that oil heating, to be successful, must be handled by men trained in heating work, that is, by heating contractors. The duty, then, that faced THE HEATING AND VENTILATING MAGAZINE was to devote its energies, first, toward the stabilization of the industry and, second, toward familiarizing heating men with the advantages of oil heat and with the opportunities it presented for opening up a brand new field of almost boundless activity.

This preliminary work now has been accomplished. Domestic oil burning may be said to be stabilized as a tried and proved method of heating homes and other buildings. Moreover, to a large extent, it has won the confidence of the heating industry. From this point its real progress must begin and *Oil Heat* is prepared to lead the way.

While the development of the technical side of the industry will receive adequate attention, *Oil Heat* will be primarily a merchandising journal. The bulk of its readers will be oil-burner dealers. Financing and merchandising, therefore, will have a prominent place in its editorial program, as will other phases quite apart from those featured in THE HEATING AND VENTILATING MAGAZINE which has been, and will remain, a strictly engineering journal.

OIL HEAT begins its career under singularly auspicious circumstances. Not only is the industry prepared for its appearance, but its launching is in direct response to most urgent appeals from responsible quarters for a journal that will sound a clarion call to the industry, and, through a definite and courageous editorial policy, will lead the industry onward to its high destiny.

Unveiling Dedication Tablet

Oscar H. Fogg,
President, A.G.A.

Alexander Forward,
Managing Director, A.G.A.

American Gas Association Dedicates New Laboratory

" . . . dedicated to promote and develop the gas industry to the end that it may serve to the fullest possible extent the best interests of the public," the new Testing Laboratory of the American Gas Association, in Cleveland, was officially opened with elaborate ceremonies, September 13.

R. M. Conner, director of the laboratory, said that the new building was the most completely equipped gas appliance and research laboratory in the world. "The building," he said, "provides roughly 3200 sq. ft. of office space, 8700 sq. ft. of storage space, and 14,700 sq. ft. for appliance testing and research. It is of two-story brick; testing rooms are spacious, and provision has been made for expansion in future years. All of the appliance testing equipment installed is automatic, so as to eliminate, as far as possible, the personal equation in our determinations. We now serve more than 200 manufacturers, and for them we have provided three large rooms. These are completely equipped, and manufacturers use them for their own work."

R. M. Conner, Director of Testing Laboratory

In unveiling the tablet, Oscar H. Fogg, president of the association, said: "The laboratory is in no sense a commercial enterprise. It is the tangible expression of the industry's allegiance to the principle that its greatest progress will be made through providing the best possible service to the American people. This structure, with its equipment, was initiated, erected, paid for, and sponsored by the organized gas industry of North America, made up of gas com-

After the Dedication Ceremonies the Invited Guests Were Served with Luncheon in a Wing of the Laboratory

The Staff of the Testing Laboratory of the American Gas Association

panies, manufacturer companies, and individuals."

Colonel Fogg made a brief address at the luncheon, and then called upon a member of the executive board of the association to make a motion that a tablet be prepared to include the names of the managing committee of the laboratory. The motion was made and passed, and the tablet will bear the following names: R. W. Gallagher, chairman, East Ohio Gas Co., Cleveland, O.; R. M. Conner, director, A. G. A. Testing Laboratory, Cleveland; J. S. DeHart, Jr., Isbell-Porter Co., Newark, N. J.; R. B. Harper, Peoples Gas Light and Coke Co., Chicago; N. T. Sellman, Consolidated Gas Company of New York; and G. E. Whitwell, Equitable Gas Co., Pittsburgh, Pa.

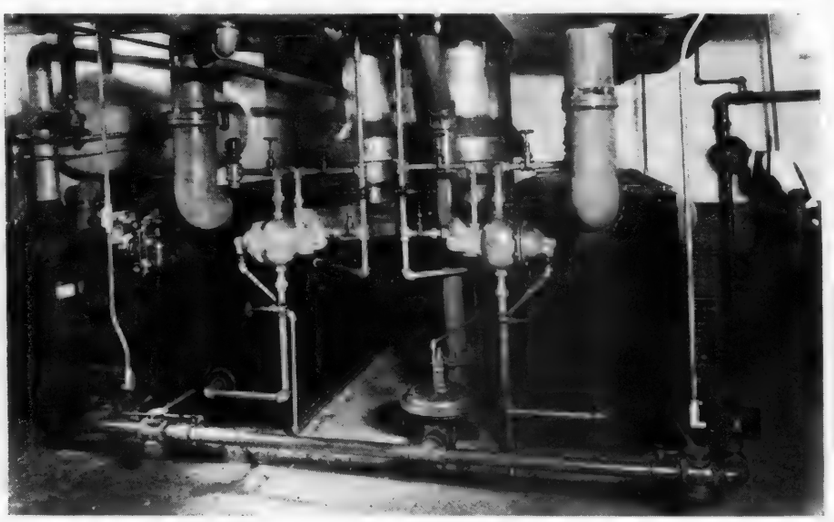
Among the other speakers at the luncheon, held immediately after the unveiling of the tablet, and at which more than 100 executives and officials of gas companies and manufacturing companies were present, were J. G. Clark, engineer of research and training, The London Gas Light and Coke Co., London, Eng., and Mr. R. W. Gallagher, president of the East Ohio Gas Company.

Mr. Gallagher gave some interesting figures about the testing laboratory. He said that since the institution was started two and a half years ago, 281 furnaces and boilers, 838 space heaters, 258 water heaters, and 9500 stoves and ranges—a total of some 11,000 gas appliances—have been approved. Laboratory inspectors have travelled 25,000 miles to inspect and obtain data on the various appliances. More than 30,000 tests already have been made in connection with the mixed-gas research being carried on at the laboratory.

This study is one of the most interesting and valuable that could be carried on for the general benefit of the gas industry. It will involve determination of the characteristics of mixed gases of varying proportions of all types of manufactured and natural gas. In some cities, the supply of natural gas is sufficient for normal gas demand, but during peak loads it has been necessary to mix the natural gas with a reserve supply of manufactured gas, the properties of the mixture having been more or less unknown quantities. Research on this problem, now being carried on at the laboratory, will provide an answer to the questions as to the proper proportions of the different gases to give the best results to the gas consumer.

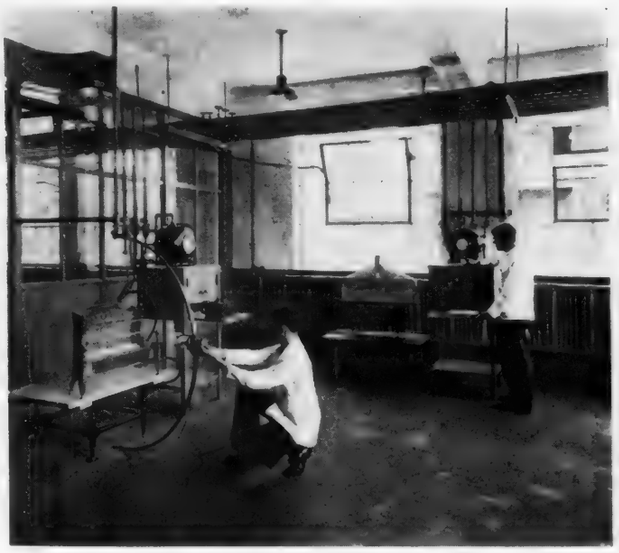
House-heating has been given serious

Engineers Conducting Efficiency and Combustion Tests on Gas Ranges



Two Gas-Fired Steam Boilers Supply Heat for the Laboratory and the Gas-Fired Water Heater Furnishes Hot Water

Conducting Efficiency Test on Gas-Fired Warm-Air Furnace



Measuring Radiant Heat Emission of Space Heaters

attention by the gas industry, and in 1925, after the original laboratory was built, a committee of thirteen prominent engineers was appointed by the association to formulate requirements for gas-fired boilers, warm-air furnaces and floor-furnaces. These men had wide experience in the design, installation and operation of automatic heating plants, and brought to their work the viewpoints of some of the most progressive gas companies and equipment manufacturers in the country. The personnel of the original committee consisted of the following: Eugene D. Milener, Baltimore, chairman; J. B. Allington, Rochester, N. Y.; C. B. Babcock, San Francisco; F. M. Banks, Los Angeles; C. L. Bryant, Cleveland; T. M. Foulke, Denver; E. L. Hall, Portland, Ore.; E. L. Payne, Beverly Hills, Cal.; A. A. Pihlman, New York; W. E. Stark, Cleveland; H. D. Valentine, Poughkeepsie, N. Y.; H. Leigh Whitelaw, New York.

This committee carried on two years of intensive work and secured the adoption, by the association, of a code of approval requirements. In this code, sight was not lost of the necessity of providing every opportunity for manufacturers to improve or better central house-heating gas appliances, and to embody individuality in their construction. Of prime importance in the drafting of these requirements were those dealing with the safety of the devices, and the tests of operation of house-heating equipment are unusually severe, so that a home-owner who buys any appliance which has been approved by the testing laboratory need have no doubts as to its safe operation.

A'though it was, at one time, a commonly held opinion that gas companies sold appliances which would consume large quantities of gas so that their revenue would be correspondingly large, the fact that every appliance approved by the testing laboratory must meēt a minimum efficiency requirement is sufficient to show that the gas companies, through the A. G. A., are doing everything possible to give their customers not only service in the way of gas supply but also in recommending to them the proper appliances.

That the code has not only met with the approval of the association, but has been actually carried out is indicated by a statement made by Mr. Conner that 30% of the gas-fired boilers and furnaces, 50% of the water heaters, 60% of the space heaters, and 75% of the gas ranges sold during the year 1928 will bear the A.G.A. approval seal. The investment of $1,500,000 for the building and equipment in the new laboratory apparently is well justified.

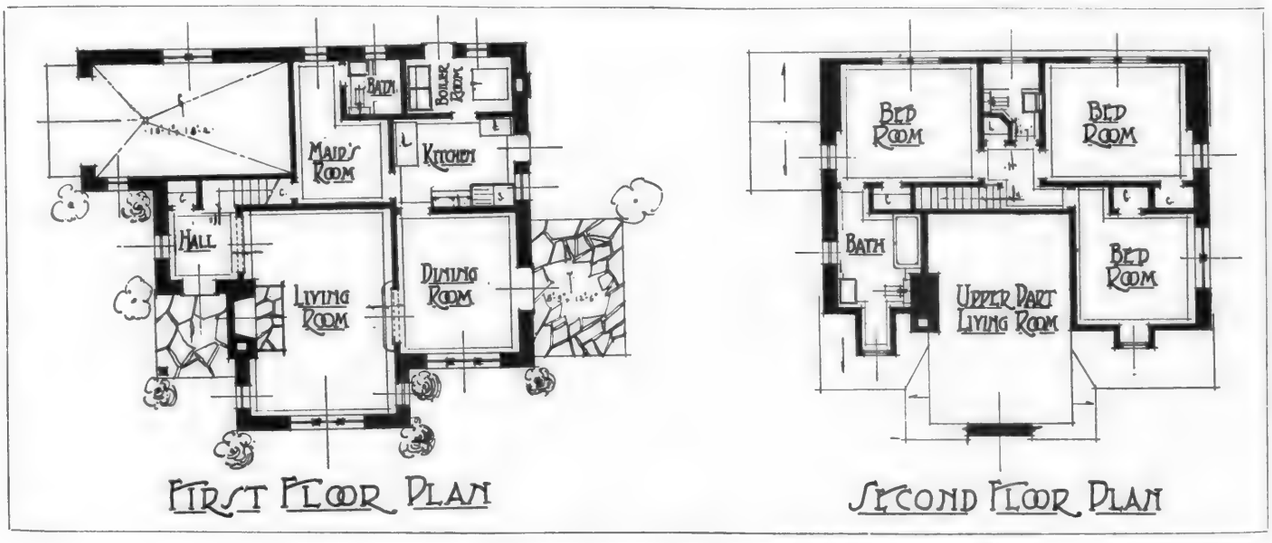
The New Laboratory

Why Build a Basement?

BY eliminating the basement and installing an oil burner with a water heating system in a small room just off the kitchen, a New Jersey architect has saved the owner $1500.

The house, designed by D. Wentworth Wright, of Maplewood, N. J., was built in South Orange, N. J. It stands on a 5-in. concrete slab which was laid over the entire floor area. Between the floor beams and the slab of concrete a space of 6 in. was allowed to promote ventilation under the floor and to provide space for the return pipes, which aid in keeping the floor warm.

In the cities where a house often occupies ground as valuable as the building itself, the cellar or basement plays an important part in conserving land space. In the suburbs, however, where land values are lower, economies may be effected by reducing, or eliminating, the basement and expanding the first floor plan to include space for the boiler. When solid fuel is used this is not feasible, inasmuch as the fuel storage requires so much space. Fluid fuels, on the other hand, need not be stored within the house. If oil is used, it can be stored in a tank under the ground outside the house or under the floor. If an oil tank is placed outside the house, the only part that appears above the ground is the fill pipe, which is situated conveniently near the driveway.



Floor Plans of an Oil-Heated House that Did Not Need a Basement

The Heating and Ventilating Magazine's
B.T.U. Club

EVERY reader of THE HEATING AND VENTILATING MAGAZINE, *whether a subscriber or not, is a member of this club. There are no initiation fees or dues. There is not even a constitution. The club will function as a forum or round table for the informal discussion by our readers, particularly the younger men, in the industry, of topics in which they are interested, provided only that such topics pertain directly or indirectly to heating and ventilation.*

Effect of Pressure on Fuel Consumption

MR. CHAIRMAN:

A few days ago the following problem was handed to me, and I now am asking you for a solution: The owner of a steam-heating system operating at 2.3 lbs. pressure with returns coming back at a temperature of 212°, contemplated changing it so as to operate at 15.3 lbs. pressure with a return-water temperature of 242.9°, the radiation being varied in amount to maintain 70° in the rooms. Which system will require the more fuel to operate? A. T. B.

(Editor's Note: This question was referred to five different engineers, the replies of each being summarized as follows.)

Answer 1. In the final analysis, there is no difference whatsoever in the cost of heating at different pressures, except for possibly a loss due to increased stack temperature caused by the higher water temperature, and also because of the greater radiation loss from boiler and piping due to the higher temperature, but even with these taken into account, the difference, if any, would be so small that it could not be detected by the most elaborate test, as the necessary error of observation would be larger than any possible difference.

Answer 2. ...the boiler operating at 15.3 lbs. gauge pressure would require more fuel due to the fact that the difference in temperature between the water in the boiler and the gases of combustion would be less than at 2.3 lbs. pressure. In other words, the higher the pressure the less the difference in temperature between the gases and the water in the boiler, and the less the amount of heat that will be absorbed by the boiler. In this particular case, assuming an average temperature of flue gases of 1250°, the low-pressure boiler would require 2.9% less fuel than the higher pressure boiler. The loss in the return water is the same in both cases.

Answer 3. It is obvious that, since the temperature maintained in the heating space is the same in each case, the net heat output of the boiler is the same in each case. That is, the number of heat units absorbed by the water over a given period of time as it passes through each boiler is the same regardless of the initial temperature or the leaving pressure. The relation between fuel input and heat output commonly is known as "efficiency." Now consider the following relations:

$$\text{Net boiler output} = \text{Heat absorbed by the boiler}$$

$$\frac{\text{Heat absorbed by the boiler}}{\text{Heat equivalent of fuel}} = \text{Boiler efficiency}$$

Apply these ideas to the two cases and we get:

$$\text{Heat absorbed by boiler (Case I)} = \text{Heat absorbed by boiler (Case II)}$$

$$\frac{\text{Heat absorbed by boiler (Case I)}}{\text{Heat equivalent of fuel (Case I)}} = \text{Boiler efficiency (Case I)}$$

$$\frac{\text{Heat absorbed by boiler (Case II)}}{\text{Heat equivalent of fuel (Case II)}} = \text{Boiler efficiency (Case II)}$$

From these two relations it is evident that, if the efficiencies are the same in the two cases, the fuel required will be the same. If the same boiler is used in the two cases, there is practically no reason to expect that the efficiencies of the boiler would differ materially. The conclusion, therefore, is that the two systems should require practically equal amounts of fuel.

Answer 4. The radiation in the rooms having been varied, thus taking care of the change in latent heat at the higher temperature, the only other point to consider is the change in temperature of the steam and condensate in the piping. It has been found that bare iron pipe with a surface temperature of 219° (corresponding to 2.3 lbs. gauge pressure) will give off 350 B.T.U. per sq. ft. per hr. as against 480 B.T.U. per sq. ft. per hr. when the surface temperature is 250° (corresponding to 15.3 lbs. gauge pressure). For piping covered with 1½ in. of 85% magnesia, the loss would be 50 and 60 B.T.U. per sq. ft. per hr. respectively. In general, therefore, the boiler when operating at the higher pressure will require slightly more fuel.

Answer 5. Assume a volume in the low-pressure system of 1000 cu. ft. to be filled with steam. Then 1000 divided by 22.98 (the volume occupied by 1 lb. of steam at 2.3 lbs. pressure) equals 43.5 lbs. of water to be evaporated at 2.3 lbs. To find the comparative size of each system.

High pressure	250° — 70° = 180°
Low pressure	219° — 70° = 149°

Since the emission of a square foot of radiation is at the rate of 1.65 B.T.U. per sq. ft. per hr. per deg. difference in temperature, we have:

High pressure $180 \times 1.65 = 297$ B.T.U.
Low pressure $149 \times 1.65 = 245$ B.T.U.

Therefore, the high-pressure system must have $\frac{245}{297}$ or 83% of the volume of the low-pressure system. 83% of 1000 cu. ft. equals 830 cu. ft. 830 divided by 13.48 (the volume of 1 lb. of steam at 15.3 lbs. pressure) equals 61.5 lbs. of water to be evaporated at 15.3 lbs. pressure. Since the latent heat of steam at 2.3 lbs. is 936.9 B.T.U., and at 15.3 lbs. is 915.9 B.T.U., we have:

Low pressure 43.5 lbs. × 936.9 B.T.U. per lb. = 40,755 B.T.U.

High pressure 61.5 lbs. × 915.9 B.T.U. per lb. = 56,290 B.T.U.

56,290 — 40,755 equals 15,535 B.T.U. more required to operate the system under high pressure.

$$\frac{15{,}535}{40{,}755} = 38\%$$ more heat required to operate the high-pressure system than the low-pressure plant.

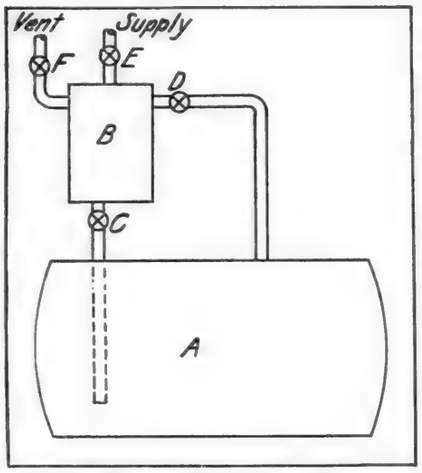
The answers in the order printed were submitted by an engineer of a boiler manufacturing company, a branch manager of a steam specialty company, a professor of heating and ventilating at a well-known university, an engineer engaged in boiler testing, and a prominent consulting engineer. The replies do not completely agree, and since this is a question the answer to which is hard to prove, it will make good material for discussion. What do YOU think is the correct answer? Send in your solution, and see if it will stand criticism. Every reader of the B.T.U. Club is invited to contribute.

An Idea for a Boiler Feeder

MR. CHAIRMAN:

Let me submit an idea for feeding water to a boiler without the use of an injector or pump of any kind. This plan is shown diagrammatically where the boiler to be fed with water is connected to a tank or vessel capable of withstanding as high steam pressure as the boiler itself "A" through valve "C" and "D". The tank "B" also has a vent line with a valve "F" and a water supply line with a valve "E". If the valves "C" and "D" are closed and the valves "E" and "F" opened, the tank "B" will fill with water through the supply pipe.

If the valves "E" and "F" then are closed and the valves "C" and "D" opened, steam will enter the tank "B" through the valve "D" and the water from "B" will flow downward through the valve "C" due to gravity, because the vessel "B" now is nothing more nor less than a part of the boiler "A", and as the water naturally seeks its level in pressure vessels, as well as in the open atmosphere it will flow downward; thus tank "B" will empty and the water level in the boiler "A" will be raised. After the tank "B" is empty the valves "C" and "D" can be closed, the valves "E" and "F" opened and the process repeated as many times as may be necessary.



How to Feed Water to a Boiler Without Injector or Pump

Naturally a few B.T.U. will be required to do this work. When the tank "B" has been emptied of all water, said vessel is full of steam, having a volume of water fed into the boiler. It is, of course, a simple matter to compute the amount of steam required to feed a given quantity of water into a boiler with this apparatus.

W. F. S.

Testing Central Heating Plants Using Gas As Fuel

By R. M. Conner

Director, A. G. A. Testing Laboratory, Cleveland.

TABLES appearing in THE HEATING AND VENTILATING MAGAZINE* indicate that at the close of the 1926-27 heating season, approximately 120,000 residential gas house-heating installations were doing missionary work for the gas industry. Of this number approximately 85,000 were warm-air furnaces. As a further example of the popularity of this class of service, I am mentioning some of the larger cities where gas is used quite extensively for house heating. Pittsburgh, Pa., for example, has approximately 14,000 installations; Portland, Ore., 17,000; San Francisco, Cal., 25,000; and Los Angeles, Cal., roughly, 40,000. All of these figures, as you will observe, are almost a year old and I presume that the total installations listed are considerably less than the actual number now existing. I am informed that Los Angeles, alone, is installing warm-air heating plants at the rate of approximately 200 per month.

Like the solid fuel furnace manufacturer, however, some of those installing gas furnaces have fallen into the careless ways of some of their predecessors, and, consequently, many gas furnace installations still leave much to be desired. Excessively long heat pipe runs, improperly sized ducts, lack of sufficient pitch, poor types of registers, and, generally, improperly designed systems have presented many difficulties to securing the satisfactory class of service that should be obtained from the gravity warm air heating system. The need for improvement of this situation was recognized some time ago and the problem was met by your association sponsoring the research program in warm-air furnaces that is now being carried out so thoroughly at the University of Illinois. I believe, however, that there is need for more research work on the whole warm-air heating subject, particularly in determining basic facts concerning heat transfer in furnaces. The effect on relative efficiencies of various shapes and designs of heating surfaces, the proper relationship of square feet of heating surface, and free areas to the amount of fuel burned—all these important factors and many others—should be investigated much further. After being determined, application of these data would no doubt effect tremendous savings of material in the manufacture of warm-air furnaces. Still further, there exists in this field the same need for standardization apparent in many other appliance manufacturing lines.

With the test method specified, it is common to secure results that agree within one per cent, which, we are inclined to feel, considering the large number of factors involved, is remarkable. The minimum efficiency that may be possessed by any warm-air furnace securing our laboratory's approval is 70% for central heating plants and 60% for floor furnaces, and any appliance bearing the laboratory's blue star seal of approval will equal and most likely exceed these figures. These efficiencies are approximately twice as high as those generally secured from solid fuel burning equipment, operating under usual service conditions.

Because the most perfect appliance may be a real offender if improperly installed, the American Gas Association prepared and recently published approval requirements for house piping and appliance installation. These requirements will be given wide circulation among gas fitters, plumbers and appliance dealers. In addition, the Pacific Coast Gas Association has published a Gas Appliance Installation and Service Manual which outlines in detail proper methods of installing gas furnaces.

*See Page 65, October, 1927.

This article was taken from a paper presented at the 15th annual convention of the National Warm-Air Heating Association.

An Engineering Survey of a Domestic Heating Plant

Before an Oil Burner Is Installed a Preliminary Examination Should Be Made to Determine Existing Conditions and Suitability of Heating Plant for Oil Heat

By T. H. Smoot

Engineering Department, Petroleum Heat & Power Company

THE purpose of a preliminary engineering survey for an oil-burner installation is twofold. It first consists of obtaining information as to the general layout of the installation, and includes consultation with the owner regarding the location of equipment such as the thermostat, the storage tank, and vent and fill fixtures. Seeking the owner's approval in these matters is advisable; it assures initial satisfaction regarding the general appearance of the job and makes certain that changes will not have to be made after the equipment is installed.

Locating Thermostat

There are a number of locations for a room thermostat that will give equal satisfaction in so far as the operation of the burner and heating system is concerned, whereas there may be only one location that, in the owner's mind, effects harmony in relation to his house furnishings and decorations. It frequently has been found a help to have a thermostat in the possession of the survey engineer at the time of the survey for obtaining a location, so the owner can be convinced of its unobtrusiveness when properly located from an engineering point of view.

Location of Tank

Location of an outside storage tank is generally a matter of importance. From an engineering viewpoint an outside tank should be located where the excavation can be best accomplished, where the top of the tank will be below the level of the burner, where the fill and suction pipe lines can be of the shortest length, with preference being given to the suction line, and where lines do not pass under driveways. In running the lines the layout of the ground must permit giving a grade to the lines which must always be down toward the tank, with the vent line included under this precaution. From the owner's viewpoint consideration must be given to preserving shrubbery, flowers, lawn and other objects of pride on his property, and it is of real importance to consult with the owner in regard to the position of the tank. Location of the vent fixture often is desired in a concealed place and also the location of the fill box might well be called to the owner's attention.

While it is preferable to put pipe lines that cross a basement floor below the floor level, the owner should be advised of this before the floor is broken and the question of waterproofing must be ascertained.

Recording Information

All of these features when determined should properly be recorded on a survey form provided for the purpose and should be accompanied by a sufficiently complete sketch to show the layout. Of equal importance to securing this information through consultation with the owner is its transmittal to those whose work it is to make the installation, so that the installation of equipment will be done in full accordance with the details which have been determined. It is good practice to secure fuel-consumption figures on previous operation of the heating plant so that you will have a basis of comparison for the relative performance of the burner. Other information to be gathered at the time of the survey is a brief story of the characteristics and operation of the heating plant.

Procedure outlined so far has to do with securing information for actually locating equipment, assuming a heating system that will operate satisfactorily, not only in the sense that it will heat the building adequately when heat is supplied to the boiler, but also in the sense that the characteristics of the plant, upon which the functioning of the burner as a separately operating unit depends, are satisfactory. This study of the plant, with respect to its ability to give adequate heat and its proper operation in connection with an oil burner, is the second purpose of the survey, and from both the standpoint of importance and its order in the making of the survey it comes before the purpose first outlined.

Figuring Boiler Load

The first step in determining the size of burner to be installed consists in figuring the boiler load. This includes not only a determination of the radiating surface installed throughout the building but also the load imposed by the piping, commonly referred to as the pipe loss, water tanks heated from the boiler and any other radiating surface or heat-using device connected to the boiler or furnace. All the necessary data and recommendations in connection with determining the total heating load should be embodied in a manual of engineering practice provided for every salesman and engineer.

It is particularly necessary where the load apparently is close to the capacity of one model of a burner that factors be applied which will take into consideration the increased heat emission of pipe coil and other special types of radiation, and of radiation standing in air at a temperature lower than the standard of 70°.

Computing Heat Loss

The question of whether the heat loss from the various rooms should be computed for the purpose of determining whether there is sufficient radiating surface installed is a matter that rests with the ideas of the individual dealers. However, the people occupying the building should be questioned regarding the degree of satisfaction given by the heating system and if there are known to be certain rooms which have not been heated properly, it would be advisable to compute the requirements in such rooms and then advise the owner in the event that the radiation is inadequate. Informa-

Examining the Secondary Heating Surfaces of a Boiler

tion necessary for computing radiation requirements and capacities, in connection with any type of heating system, should be possessed by all dealers in order that they can determine full particulars on such a subject as this.

Heating Troubles from Faulty Design

In the event that lack of sufficient heat in a particular room is not due to inadequate radiation, the trouble lies in either the piping system or boiler, and the person making the survey should be qualified to analyze such troubles and find the cause. Heating troubles that are known to exist should not be passed over, but should be traced to their cause. There is a more or less general opinion that a heating system which has failed to give adequate heat or has shown any other fault when operating with coal will be no worse with oil and that it probably will show very much improved results when the oil burner is installed. This may be true and it may not be true, depending upon the nature of the trouble. On the other hand, defective systems that have operated satisfactorily with coal have shown defects only after the system was operated with an oil burner.

I have in mind a one-pipe steam system which was designed with the risers and other piping too small and without proper pitch. Under operation with coal where a steady fire was carried, the radiators and piping always were relatively warm, and a high condensing rate when warming up the system was eliminated. When the oil burner was installed, however, the condensation to be handled was greater, due to the increased rate at which steam was supplied by the larger fire, and by the high rate of condensation in warming up the piping and radiation each time the burner was started up. The area of the piping was too small to carry off the condensate without it building up in places and this, combined with the high steam-velocity through the smaller pipe, resulted in water hammer every time the burner started up, the objectionable noise continuing until the system was warmed up and the rate of condensation reduced. The oil burner, therefore, imposes a greater load on such a piping system, and it is necessary that it be more nearly up to requirements than for operation with coal.

In warm-air systems, when coal is used, it sometimes is not quite so important that the system be designed with a high degree of accuracy as when oil is to be the fuel. If a certain warm-air pipe is installed undersize, the circulation usually can be started through this pipe by turning off some of the other pipes. Then, after it is started, the other pipes may be opened again and circulation will continue through the small pipe. With the oil burner, however, this circulation would be lost several times a day if the burner shut down for periods of any considerable length.

Full data for the sizing of pipes for various types of heating systems, the grading of pipe and other design information should be in the files of every dealer. In shooting trouble in a piping system there is required a man of experience and a good knowledge of heating systems in general.

After the aggregate radiation load has been figured the next step is to determine the rating of the boiler. This should be done with a view of not only determining that the boiler has adequate capacity for handling the connected load but also that it is properly proportioned for a burner that would have sufficient capacity for the load. By that I mean that with a boiler rating greatly in excess of the radiation load, a burner selected according to the radiation figure might be inadequate because of the size of the boiler. For example, if a job has a total load of 1000 sq. ft. and is connected to a boiler with a rating of 2000 sq. ft., a burner which is rated at a maximum capacity of 1000 sq. ft. would be too small to handle a job of such proportions.

Warm-Air Furnace Must Be Tight

After checking the boiler capacity, the next consideration is the condition of the boiler or furnace. The necessity for an absolutely tight combustion chamber in a warm-air furnace is well known but it is, nevertheless, of so great importance as to be worth special mention. We are not concerned with the more recently developed steel furnaces with one-piece combustion chamber, as this type can be relied upon as gas tight. It is the sectional cast-iron furnace that will prevent good heating service with a good burner and an otherwise good heating system unless the combustion chamber of the furnace is gas tight. The intermittent firing of an oil burner, with the resultant expansion and contraction of the furnace sections due to heating and cooling, soon will show up any leaks and make them worse. Precautions should be taken to determine that a furnace is absolutely tight before the burner is installed and if it is not tight, it should be torn down and re-cemented at the joints.

Cleaning the Heating Plant

It is good practice to thoroughly clean the heating surfaces of a boiler or furnace before a burner is installed. Soot is one of the best-known insulators, and if economy of operation is to be obtained the surfaces must be clean. Not only from the standpoint of heat transfer is it important that the passes of the boiler be clean but also in order that the flow of combustion gases out of the combustion chamber may not be obstructed. Such restrictions place an extra burden on the chimney which, in most cases, is so constructed and of such proportions that it cannot stand much obstruction if it is to do its work properly.

Not only should attention be directed to the cleanliness of the exterior of the heating surfaces but also to the interior. The presence of oil, grease and pipe scale in a steam boiler results in unsatis-

factory heating as it causes foaming and priming. Such a condition also is objectionable from the standpoint of excessive fuel consumption. The oil burner, with a high firing-rate and short heating period, generally will show up such a condition that may have been existing with coal burning operation, but to a lesser degree, because of the slower rate of combustion. The only remedy for such a condition is to clean the interior of the boiler, and there are many acceptable methods for doing this.

Relation of Boiler and Chimney

An item of inspection that should be gone into with the greatest thoroughness, because of its relation to the proper mechanical functioning of the burner, is the condition of the boiler with respect to its effect on the draft. The relation of the boiler and chimney in this respect is interdependent in that the proper action of the chimney depends upon the cleanliness and tightness of the boiler so that the two will be discussed together.

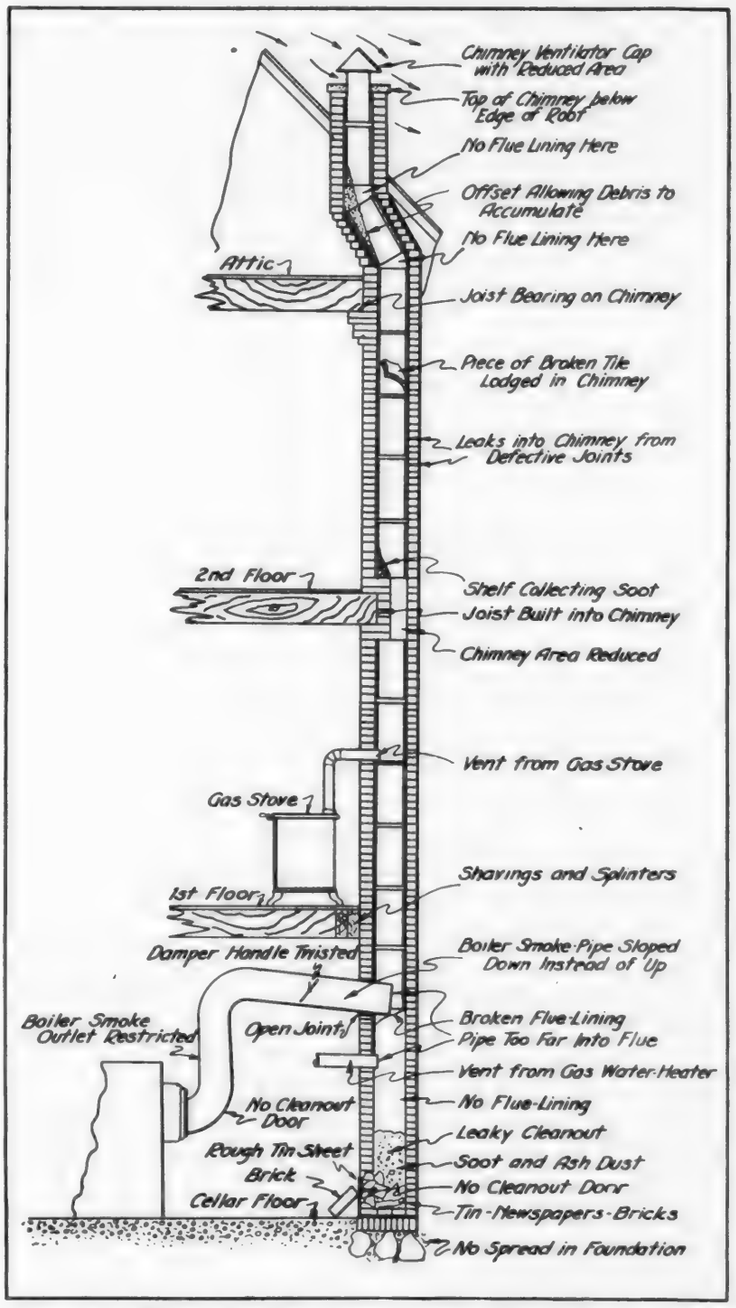
Chimney action takes place through the difference in weight of the column of gases in the chimney and the weight of a column of air of the same height outside the chimney. The intensity of draft in a chimney, which determines the velocity with which it will pass the gases, varies directly with the height of the chimney and the difference in temperature between the gases and the outside air. In addition to a chimney having the required height, it also must have sufficient area to carry away the volume of combustion gases at the velocity corresponding to the draft intensity. A chimney may be high enough, yet with an area too small to do the work required. On the other hand, it may be large enough but too low to produce sufficient draft intensity. Either fault, or a combination of both, will result in unsatisfactory service and require remedying.

The draft intensity which is necessary will vary with the boiler in direct proportion to the resistance to be overcome, as determined by the length and travel of the indirect flue passes and, therefore, the required draft intensity will vary with different boilers.

Draft intensity will be decreased by leaks through cracks in the chimney, through loose connections of the smoke pipe, by the smoke pipe being too long and not grading up from the boiler or furnace and because it protrudes into the chimney beyond the inner surface of the flue. Draft also will be lost through loose-fitting check dampers and boiler doors and by leaks between the boiler base and foundation. The volume of gases that will pass at the available draft will be reduced by accumulations of dirt and soot in the boiler flue passes, by loose bricks and by lining protruding into the chimney flue.

The chimney should be carried straight up from the bottom to the top; should have no other connections into it and the inner surface should be smooth. The top of the chimney should be carried three feet above the highest point of the roof and so located, with respect to nearby buildings, trees or other objects, that wind currents will not form eddies and produce down drafts through the chimney.

The loss of draft through an oil-fired boiler is less than with a coal fire, because the resistance through the fuel bed does not have to be overcome. With a properly adjusted oil fire, however, the stack gases will be at a lower temperature than with a coal fire and the draft intensity, therefore, will be reduced. The fact also must be kept in mind that an intermittent oil fire operates at a greater rate of combustion than a steady coal fire and this results in the formation of a larger volume of gases per minute of operation, which must be carried away. In addition to this, the oil fire requires that the chimney carry off the gases which are generated at starting at a constant rate under the conditions of a cold boiler and chimney. These added burdens upon draft conditions will generally



Some of the Things that May Prevent Proper Functioning of a Burner and that Should Be Checked Before an Installation Is Started

offset any advantage through the elimination of the loss through grate and fuel bed.

For best operation, therefore, a chimney of the proportions as recommended by the boiler manufacturer for operation with coal should be available, and this may be used as an authoritative index as to whether draft conditions will be above or below standard.

Examination for Draft at Time of Survey

At the time of the preliminary survey, a determination of all leaks and obstructions cannot be made, as a complete examination of this nature can better be made at the time of installation. The general condition of the chimney and gas travel system can be observed at the time of the survey, however, and most important, the construction and proportions of the chimney. Loss in the gas travel system which results from leaks can be remedied as also can be decreased capacity through obstructions.

When poor draft conditions will result from an inadequate or improperly constructed chimney, serious consideration must be given to the desirability of accepting the contract. If a chimney is, to any great extent, below the standards of good construction and the proportions specified by the boiler manufacturer, there is imposed a strong possibility that satisfactory operation and proper functioning of the burner will not be obtained.

In order that combustion can progress, it is necessary that the products of combustion be removed from the combustion chamber at the rate at which they are generated. This must take place in order that the products of combustion, which are for the most part inert and are in effect an excellent fire extinguisher, will not diffuse through the mixture of atomized oil and air and blanket this combustible mixture so as to produce floating of the flame and possible extinguishment of it.

Inasmuch as the draft intensity varies directly as the difference in temperature between the gases in the chimney and the outside air, the draft will decrease as the outside air temperature increases, and it is because of this that draft conditions are poorest in the summer time.

Torch Test No Indication of Necessary Draft

It is necessary that such a condition exist in the chimney that the gases will be moved without first being warmed so as to produce a circulation. If no draft intensity exists at the start of the fire, the products of combustion will not be carried out of the furnace and trouble will result. It is further necessary that this draft intensity be above a certain minimum figure for the start because, as stated before, the products of combustion must be removed at the same rate as generated and not allowed to accumulate and diffuse through the flame. The mere fact that a torch flame will be drawn in through a door of a cold boiler is not sufficient indication of a good draft because it may not be strong enough to move the gases at the necessary velocity.

If the air in the chimney and outside are at the same temperature, it is obvious that there will be no circulation, and if there is but a slight difference the products of combustion may not be moved fast enough, depending of course, upon the height of the chimney. Once the stack is warmed, however, circulation will be established, and it is for this reason sometimes when a job has been inoperative for a long period and it will not maintain a fire at the start that recycling will produce sufficient circulation to maintain a fire on a subsequent start. It is not only the increase in the temperature that serves to produce a draft by this procedure but also by the moving of the column of air in the chimney from the action of the fan, and due to the inertia of the column of air this movement that has started will have a tendency to continue.

Necessary Combustion Volume

When bricking in a combustion chamber the minimum requirements of combustion volume must not be disturbed. A recommended practice in this respect is to provide 1 cu. ft. of combustion space for every 35,000 B.T.U. liberated per hour, and a minimum figure to observe is 1 cu. ft. of combustion space per 2½ lbs. of oil burned per hour.

The function of an oil burner is to prepare the oil for combustion and distribute it in the combustion chamber together with the necessary volume and degree of mixture of the air. In connection with the burner the combustion chamber must be bricked so as to provide for burning the oil in a chamber of sufficiently high temperature to promote good combustion. Beyond this point satisfactory heating results, and even the mechanical functioning of the burner depends upon the design and condition of the heating system.

Modernizing Totals 25% of Building Volume in Duluth

Duluth has become interested in home modernizing, and the Duluth Builders Exchange has taken the initiative in promoting a home-modernizing bureau in that city. A permanent organization was proposed, with a budget of $25,000 for the first year's operations. This budget will include advertising in the Duluth newspapers, and the hiring of a full-time manager, with headquarters in the exchange offices.

Out of 186 building permits in Duluth, issued in August, and totaling $173,612, 111 of them, totaling $39,547, were for repairs and alterations to dwellings, while 18, totaling $4505, were for repairs and alterations to commercial and industrial buildings. In other words, without a bureau established to sell modernization to the people of the city, 25% of the volume of building for August represented modernizing work. The outlook is exceedingly bright for still larger amounts being spent for home improvement after the bureau is organized.

$16,500 Worth of Heating and Plumbing Equipment Sold in Topeka Modernizing Campaign

Six heating and plumbing contractors and one wholesaler of Topeka, Kan., contributed $100 to the home-modernizing campaign being conducted in that city. As a return, they have sold $16,500 worth of equipment for the 50 houses being modernized. In other words, for these six retailers the net return on money invested in home modernizing is about 2000%.

The home-modernizing campaign in Topeka was started with a display advertisement in the Sunday newspaper on May 27. Since that time $100,000 has been spent on the 50 houses undergoing rehabilitation, and plans have been drawn for the remodeling of 34 others. One of the owners is making a thorough job of it and investing $7000 in the modernizing of his home; he is installing a new heating plant and two new bath-rooms. Heating and plumbing contractors report that, on the average, the men who are remodeling their houses are buying high-quality material.

Topeka was the first city to be organized by the home-modernizing bureau of the National Building Industries. When the local organization was started in May, 95% of the building supply groups in Topeka joined the association, and all of the financing agencies and contractors in the city also became members. The total membership is 68. In addition, the movement has the endorsement of the Topeka League of Building and Loans, the Topeka Builders' Club, the Topeka Real Estate Board and the Topeka Merchants' Association.

Home-modernizing campaigns have been organized permanently in nine different cities, and six cities have temporary organizations perfected. Responsible leaders are developing sentiment in 47 other cities.

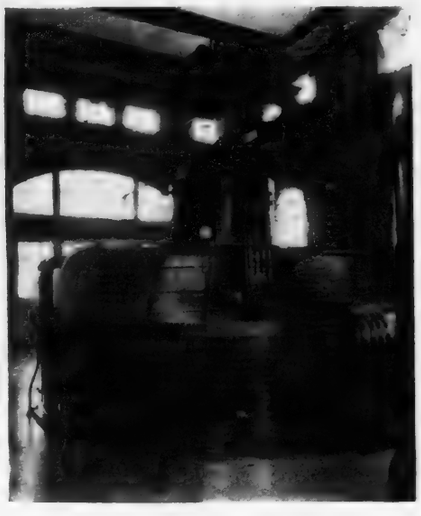
This Hydroelectric Station Is Operated without Attendants and Is Controlled from the Main Station at the Opposite End of the River

Remote Control of Ventilation in Hydroelectric Station

TEMPERATURE conditions in the new Androscoggin No. 3 hydroelectric station are recorded automatically in the old station, 300 feet across the river, and operators there manually control the ventilation in the new station so that the correct air conditions will be maintained. The generators are started and stopped, thrown on and off the line, and further remotely controlled in the same manner.

It is essential that room temperature be not too high in the station, so that there will be no overheating of the electrical equipment. In order to control the temperature, the basement window openings are provided with rolling steel shutters and steel louvres instead of glass. One set of shutters is motor operated and controlled by push-buttons from the Deer-Rips switchboard whenever the temperature indicating devices call for a change in temperature. Up in the generator room, the windows on one side are motor operated and controlled in the same manner from the other side of the river. In each case there are automatic stops that prevent over-travel in each direction.

Androscoggin No. 3 is the third station within a distance of a mile on the Androscoggin River above Lewiston-



Electrically-Operated Sash and Shutters and One of the 5500 H.P. Turbo Units in Deer Rips Plant of Central Maine Power Co.

Auburn, Me. The new station contains one 5500 H.P. water-wheel directly connected to a 3600 K.W. generator, making a total of 41,000 H.P. developed by the three stations. Allis-Chalmers furnished the water-wheel, which is of high-speed type with five blades.

Costing $380,000, the undertaking required the services of a working force averaging 110 men for ten months; the payroll alone for the ten months accounts for approximately $125,000. Designs for the station and incident construction work were prepared by the engineering department of the New England Public Service Company, under the direction of Frank H. Mason, chief engineer. Ford W. Harris was the resident engineer for the Central Maine Power Company. Construction was under the supervision of the Morton C. Tuttle Company, of Boston, represented on the job by Frank Creedon.

Huge Tunnel Projects Follow Success of Holland "Tubes"

SINCE the building of the Holland Vehicular Tunnel under the Hudson river, underground life in buildings, tunnels, and subterranean highways is becoming more of a reality than ever, as projects for such construction are multiplying throughout the United States while other nations are planning super-tunnels that will make the most modern of those of today seem small in comparison. In this country alone engineers have planned tunnels, the cost of which, if built, will exceed $100,000,000.

This world-wide epidemic of tunnel building received its greatest single impetus from the outstanding success of the Holland vehicular tunnel and the fact that the operation of its mechanical ventilation has proved so successful. Tests show that air conditioning maintains air in the Holland Tunnel purer than that in the open spaces of Fifth Avenue, despite the fact that thousands of automobiles pour out great quantities of carbon monoxide every hour.

The Liberty Tunnel in Pittsburgh was the first of the modern tunnels in which mechanical ventilation was employed to a large extent, and studies of air conditions within it figured prominently in the plans for the Holland Tunnel. Of the projects now under way, the most unusual in conception and method of building is the giant, underwater, vehicular tube to connect Oakland, California, and Alameda, extending under the Oakland inner harbor. This tube, which will be opened next July and will have cost $4,500,000, is 4400 ft. long, and has an inside diameter of 37 ft.—20% larger than one of the Hudson twin tubes. It will contain two street-car tracks, and the roadways will be capable of handling a traffic flow of 2000 automobiles per hour.

To ventilate this tunnel, fresh air will be drawn in at a portal building at each end, where 16-ft. fans driven by 100 h.p. motors will force it into ducts underlying 3-ft. sidewalks on each side of the tube. Adjustable sheet-metal coverings on crevices along the curb will control the amount of air which will be released into the tunnel. Vitiated air will be drawn off through ceiling louvres at 15-ft. intervals carried outward to each end in the attic chamber and released at the portal buildings.

Piercing the Rocky Mountains for more than six miles through the Continental Divide, the Moffat-Evans Tunnel between Denver and Salt Lake City cost $42,000,000 to build. To drive dangerous gases and smoke out of the tunnel, huge fans were installed to blow 65-mile gales through the passage, the fans handling 450,000 cu. ft. of air per minute.

Detroit has started the construction of a vehicular tunnel between the heart of its business district and Windsor, Ont. This tunnel, which will be 5300 ft. long, ventilated by fans which will completely change the air in the tunnel every 1½ minutes.

Albany is planning a $5,000,000 tunnel between that city and Rensselaer on the other side of the Hudson River. Automobiles will enter and leave the tunnel by spiral "staircases," each vehicle making two downward circles before reaching the tunnel level from the street.

England and France again are agitating the question of a tunnel under the English Channel between Dover and Calais. This, if accomplished, would be the largest of the kind in the world. Lionel Smith-Gordon, a Dublin banker, was in New York recently with several British engineers to inspect the Holland Tunnel and especially its ventilating system. He believes the same system can be applied to the longer tunnel needed to connect England and France. In drafting preliminary plans for the Dover-Calais tunnel, the engineers are figuring on the construction of an artificial island, in the middle of the Channel, on which would be built a structure to house the ventilating equipment.

One of the most spectacular of foreign projects now proposed is that which would connect Gibraltar, under the Mediterranean Sea, with the nearest northwestern point of Africa at Tangier. Whether the volume of traffic would be sufficient to pay for this tunnel is yet to be determined.

New Engineering Standards Issued

Engineering Standards, Part II, "Net Square Feet Radiation Loads in 70° F., Recommended for Low Pressure Heating Boilers" has been published by the Heating and Piping Contractors National Association. These sheets give the net loads in direct cast-iron radiation recommended for round and sectional cast-iron boilers burning coal over 12,000 B.T.U. per lb. for sizes under 520 sq. ft. load, and 11,000 B.T.U. for all ratings over 520 sq. ft.

Factors are given so that if coal of any other heat value is to be used, the load can be multiplied by the proper factor. Corrections also can be made for buildings heated to other than 70°.

In view of the great difficulty experienced by contractors in selecting boilers of proper size, these sheets should prove of great value. It is necessary to note only the length of the boiler between the outside face of the front and rear sections and the grate width in order to determine the amount of steam or water radiation. In the case of round boilers, the grate diameter, the number of intermediate sections and the type of crown sheet must be known. Minimum chimney requirements also are listed with the various round boiler sizes.

Government Issues New Publication

A new monthly publication has been started by the Bureau of Standards to replace the two series of research papers "Scientific Papers" and "Technologic Papers." The new journal will be named the *Bureau of Standards Journal of Research* and will contain the bureau's research papers and critical reviews in the fields of science and technology. Covering both pure and applied science, the new journal will tend to bridge the gap between the two fields and consequently shorten the lag between discovery and its application.

Bureau researches concern specifically fundamental science and the laws of matter and energy; physical constants and other basic data in the form of tables, equations, nomograms, or other graphs; the properties of materials, structures, and devices and their effective design and performance; the mitigation of injurious effects of such agencies as fire, corrosion, breakage; the promotion of efficiency by scientific measured control of processes through experimental and theoretical research in the fields of physics, chemistry, engineering, and the special technologies, such as electricity, magnetism, radio communication, photometry, spectroscopy, polarimetry, atomic physics, etc.

Correspondence

Another Method Suggested for How Would You Do It? Problem

EDITOR HEATING AND VENTILATING MAGAZINE:

In checking over the problem in "How Would You Do It?" designated as *Question No. 13*, in the issue for August, 1928, and the answer in the September issue, I find there are some differences in the method and results obtained. I would like to ask your criticism of the methods that I used. For your information I took the data from table 14, Page 72 of the A.S.H. & V.E. *Guide* for 1928, and plotted them. I then extended the curves so that the heat transmission from the radiator was for degree difference in temperature between the radiator and the room. A copy of this chart is attached. The following are the methods that I used:

One-Hour Period.

B.T.U. required to heat water
$500 \times 8.33 \times 140 = 583{,}333$ B.T.U.

B.T.U. required to heat tank
$980 \times 140 \times 0.12 = 16{,}464$ B.T.U.

Radiation from tank
Area of tank 98 sq. ft.
Average temperature of tank

$$\frac{200° + 60°}{2} = 130°$$

Average temperature of air
Average difference

$$\frac{80° + 60°}{2} = \frac{70°}{60°}$$

An average radiator gives off 240 B.T.U. per sq. ft. with steam at 2 lbs. gauge having a temperature of 220° F. when standing in still air at 70° F. From table 14, Page 72, of the 1928 A.S.H. & V.E. *Guide*, the extrapolated data as plotted on my chart, show that, with 60° difference in temperature between the radiator and the room, the radiator will give off only 36% of the heat as measured under standard conditions, or 86.4 B.T.U. per sq. ft.

For the total area
98×86.4 B.T.U. $= 8467$ B.T.U.

The total B.T.U. is as follows:

Heating water	583,333
Heating steel tank	16,464
Radiation loss	8,467
	608,264

Three-Hour Period.

Average temperature rise per hour of tank, 46.7°
Average temperature rise per hour of air, 6.7°
Average temperature tank first hour,

$$\frac{60° + 106.7°}{2} = 83.3°$$

Average temperature of air first hour

$$\frac{60° + 66.7°}{2} = 63.3°$$

Average temperature difference $= (83.3° - 63.3°) = 20°$

From the chart, the heat from the tank per sq. ft. at 20° temperature difference $= 0.11 \times 240$ B.T.U. $=$ 26.4 B.T.U.

And for the total area:
98×26.4 B.T.U. $= 2587$ B.T.U.

Average temperature tank second hour

$$\frac{106.7° + 153.3°}{2} = 130°$$

Average temperature air second hour

$$\frac{66.7° + 73.3°}{2} = 70°$$

Average temperature difference $= (130° - 70°) = 60°$
From the chart, the heat from the tank per sq. ft. at 60° temperature difference $= 0.36 \times 240$ B.T.U. $=$ 86.4 B.T.U.
And for the total area
98×86.4 B.T.U. $= 8467$ B.T.U.

Average temperature tank third hour

$$\frac{153.3° + 200°}{2} = 176.7°$$

Average temperature air third hour

$$\frac{73.3° + 80°}{2} = 76.7°$$

Average temperature difference $= (176.7 - 76.7°) = 100°$

From the chart, the heat from the tank per sq. ft. at 100° temperature difference $= 0.666 \times 240$ B.T.U. $=$ 158.4 B.T.U.

And for the total area
98×158.4 B.T.U. $= 15{,}523$ B.T.U.

Total radiation loss

First hour	2587
Second hour	8467
Third hour	15523
	26,577 B.T.U.

Summary for three-hour period

Heating water	583,333
Heating steel tank	16,464
Radiation loss	26,577
	626,374 B.T.U.

Steam required for one-hour period

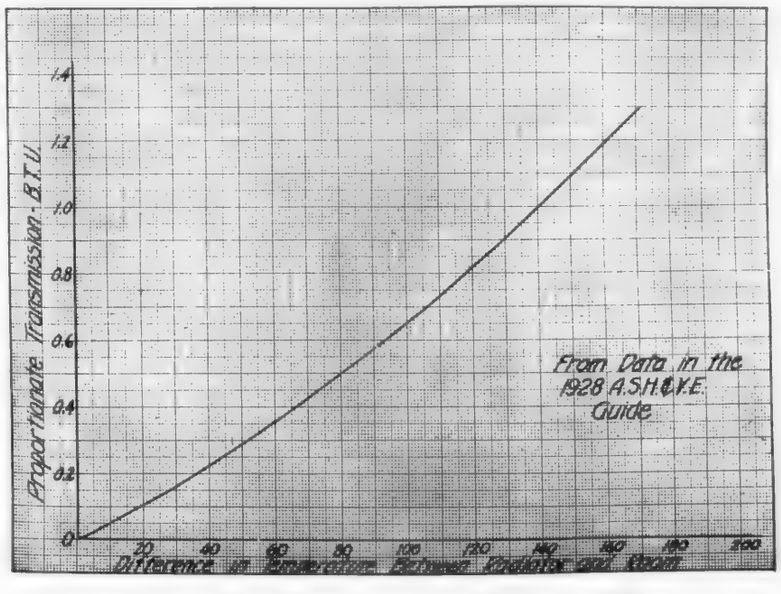
$$\frac{608{,}264}{1000} = 608.3 \text{ lbs.}$$

Steam required for three-hour period

$$\frac{626{,}374}{1000} = 627.4 \text{ lbs.}$$

The three-hour period consequently requires an excess over the one-hour period of $(627.4 - 608.3) = 19.1$ lbs.

Joliet, Ill. W. B. R.



Relation Between Heat Transmission of a Radiator and Temperature Difference Between Steam and Room Temperatures

Editor's Note—There are two separate criticisms submitted by our correspondent to the solution of this problem, as published in the September issue. The first involves an error in the calculation involving the amount of heat to raise the water from 60° to 200°. Our solu-

tion incorrectly gave this as 58,333 B.T.U., when it should have been, as our correspondent shows, 583,333 B.T.U. Consequently, the error having been carried through, the amounts of steam for the two different methods were incorrect. However, since the figure for the one operation was the same for both the one-hour period and the three-hour period, the final answer, being the difference between the totals, was correct for the method used.

The second point raised by our correspondent is that data from the *Guide* should be used instead of the coefficient of 1.6 B.T.U. per sq. ft. per degree difference in temperature, as was done in our solution.

Either method is an approximation. As the chart shows, the relation between the heat transmission and the temperature difference is not directly proportional, for, if it were, the curve would be a straight line. Consequently, the method used in our solution is an approximation. The method used by our correspondent, although perhaps more nearly correct than our solution, also is an approximation, because the table from the *Guide* is based on a steam temperature of 210° in the radiator, and the results are shown for varying room temperatures. In our problem, the room temperature, as well as the steam temperature, was a variable, so that the results given in the *Guide* do not necessarily apply, although they are the logical figures to use in the absence of any others dealing with radiator and room temperatures, when both are variable.

Further correspondence will be welcomed, and we shall be glad to publish any letters based on other methods of solution of this problem.

New York University Offers Three-Year Evening Courses

New York University, which has been giving a three-year evening course in heating and ventilating for the last three years, has announced the program for this line of study for the year 1928-29. It is intended to augment the practical experience already gained by those now employed in the design, erection, and operation of heating and ventilating equipment, as well as to prepare those who are about to enter the field. Among the courses included in the curriculum are theory and application of heat, heating systems, principles of heating and ventilating design, fuel technology, steam and hot-water heating design, ventilating equipment design, and heat engineering laboratory.

Another of the three-year evening courses announced for the coming year is combustion engineering, which takes up fuel technology, oil-heating equipment, boilers and furnaces, oil burner installations and maintenance, fuel handling and transportation, artificial and natural gas-fired plants. Laboratory work is included with many of these courses, which will be under the direction of Collins P. Bliss, associate dean of the college of engineering.

Patents and Patent Law

Anyone who has been involved in the intricacies of patent law, inventors, or those seeking to protect inventions, will find much of value in the fourth edition of "Patents—Law and Practice," by Oscar A. Geier. Under the heading "The Nature and Theory of a United States Patent," the grant for a patent is defined as "a paper issued in the name of the United States of America under the seal of the Patent Office signed by the Commissioner of Patents, containing a short title of the invention, and purporting to grant to the patentee, his heirs and assigns for a period of seventeen years from the date of the grant, the exclusive right to make, vend or use the invention throughout the United States and the territories thereof, and it refers to the specification for the particulars of the invention." It is further stated that "it is essential to this right to exclude others that the invention be new, and also that the intangible something we call invention, and not mere mechanical skill, be involved, otherwise the patent will be declared invalid by the courts."

What can be patented, the novelty required in an invention or discovery, and the secret practice of an invention are all discussed at some length, free, however, from involved legal phraseology. The author then goes on to explain the steps to be taken in making an application for a patent. Along these lines it is said that "a failure to describe an essential element voids the patent . . .," making it clear that the proper drafting of the specifications is an exceedingly important part of the detail connected with securing a patent.

Interferences are defined in patent law as "a proceeding instituted in the Patent Office for the purpose of determining the priority of the inventive act between two or more parties claiming substantially the same patentable invention." This subject is covered in an able manner. Reissues, infringement and ownership are next taken up, the last being a subject always of interest to employers and employes, and of which the author says that "while the courts lean to the side of the employer on the question of originality, they lean to the side of the employe on the question of ownership."

Among the other subjects covered are design patents, trade-marks, foreign patents and copyrights. Size 6 in. x 9 in. Pp. 46. Sent free of charge to those interested by the publishers Richards and Geier, 274 Madison Ave., New York, or may be had through the book department, THE HEATING AND VENTILATING MAGAZINE.

American Gas Association Convention

The annual convention of the American Gas Association is being held October 8-12 on the Million Dollar Pier at Atlantic City. Over 75,000 square feet have been taken by exhibitors, the largest record amount of floor space ever taken for an A. G. A. convention, and it is fully expected that the attendance this year will exceed previous records.

Thursday afternoon, October 11, a symposium will be held on the subject of experience in securing and maintaining automatic house heating with gas. At this meeting data on installation costs, daily load curves, cost to customers in comparison with other fuels and other subjects pertinent to gas heating will be discussed.

Among those who will take part in this meeting will be: George E. Whitwell, Equitable Gas Co., Pittsburgh, Pa.; W. B. Clemmitt, Consolidated Gas, Electric Light & Power Co. of Baltimore, Md.; P. A. Nelles, Malden & Melrose Gas Light Co., Malden, Mass.; B. H. Long, The Kompak Co., New Brunswick, N. J.; A. L. Klees, Combustion Utilities Corp., New York, N. Y.

Plumbing and Heating Industries Bureau Moves to New Quarters

The Plumbing and Heating Industries Bureau now is located in its new permanent headquarters in the Pure Oil Building, 35 East Wacker Drive, Chicago, Ill. A lease for ten years was taken on the space in this building after a careful survey of the available space in Chicago was made by the executive committee of the board of directors.

The Pure Oil Building is one of the newest business buildings in Chicago and rises forty stories above the plaza adjoining the junction of Michigan Boulevard and Wacker Drive. The bureau occupies 4187 sq. ft. on the sixth floor.

From a small beginning in one office in Evansville, Ind., where it was started in June, 1919, the bureau has expanded until today it is one of the largest of the national trade associations and has a budget of over $400,000.

The Weathertightness of Rolled-Section Steel Windows

By J. E. Emswiler and W. C. Randall

IN the steel window there will be little or none of the frame leakage often found in wood windows, because the steel framing usually is installed in the opening with grout or mastic, and the coefficient of expansion of steel is so near that of building construction that the bond is maintained intact. Cracks at mullions and at contacts where the windows are attached to the steel framework are found to give negligible leakage if even ordinary care is exercised in installation.

Some heating engineers allow the same leakage per foot of crack at mullions and contacts with steel frame work, as for ventilator perimeter, but this does not seem justifiable in the light of the tests. Poor installation in mixed steel work represents less leakage per foot of crack than that from 1/32-in. crack of an industrial pivoted ventilator; and poor installation of mullions about one-half as much. Mastic sometimes is used to decrease this amount.

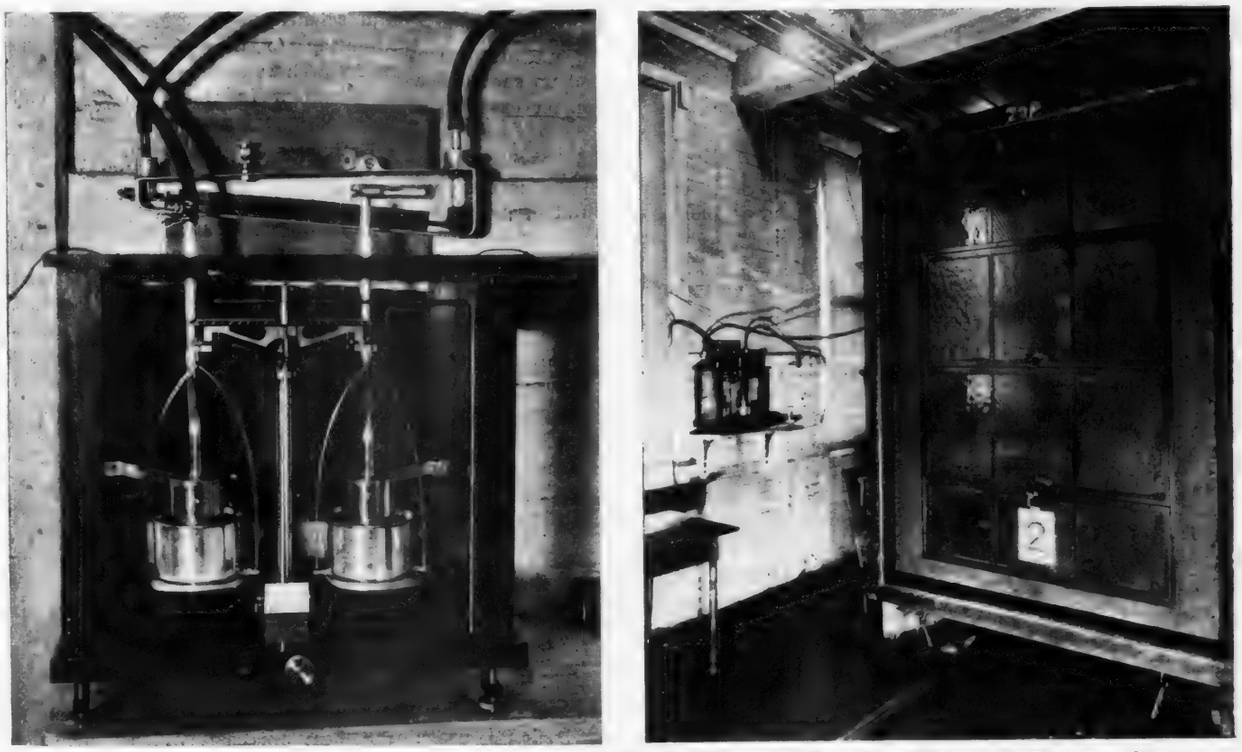
Realizing the necessity for securing accurate data as to crack widths found in windows of the type under investigation, the authors made measurements on windows in eight buildings at the University of Michigan and several in Detroit. No attempt was made to examine all windows in these buildings, but a sufficient number was taken to give fairly representative figures. These figures, while not presented as representative of steel window construction throughout the country, give some idea of what crack widths may be found in practice.

While numerous factors contribute in a very complex way to determine pressure difference, the actual measurement of it in a building is a simple thing. What is needed is a recording device that can be set up in various

From a paper presented at the semi-annual meeting of the A. S. H. & V. E.

MEASURED CRACK WIDTHS OF STEEL WINDOWS IN SERVICE

Building Designated by Letter	Type of Window	Number of Ventilators Having Crack Width Indicated Which Represent the Average of a Number of Trials at Edges of Ventilators — Inches 0.006	1/64	1/32	1/16	1/8	1/4	Total No.	Avg. Crack Inches
A (U. of M.)	Heavy section casement	7	28	25	4	4	...	68	1/32 —
B (Detroit)	Residential casement	56	39	6	1	...	...	102	1/64 —
C (U. of M.)	Heavy casement section projected	..	8	12	9	7	...	36	1/64 +
D (U. of M.)	Heavy casement section projected	58	214	6	10	2	...	290	1/61
E (U. of M.)	Heavy casement section projected	77	127	10	..	...	...	214	1/61 —
F (U. of M.)	Industrial pivoted	..	7	19	30	35	6	97	3/32 —
G (Detroit)	Industrial pivoted	16	45	46	27	11	15	160	1/16 —
C (U. of M.)	Commercial projected	..	...	..	..	128	103	231	3/16
H (U. of M.)	Commercial projected	..	80	24	6	...	...	110	1/61 +
I (U. of M.)	Architectural projected	43	41	5	21	...	...	110	1/64 +
J (U. of M.)	Architectural projected	6	53	13	10	6	...	78	1/32 —
K (U. of M.)	Architectural projected	76	90	13	..	...	...	180	1/61 —



Determining Pressure Drop Across Steel Window (Right) By Means of Emswiler Differential Pressure Gauge (Shown in Detail at Left)

places in different buildings to operate more especially during the season of extreme weather conditions. The accumulation of records from a number of instruments would in time furnish definite information on pressure difference which, taken in conjunction with laboratory data now available, and crack widths guaranteed by manufacturers, would make it possible to definitely determine infiltration.

Following a suggestion received from the paper by Messrs. Houghten and O'Connell in the *Journal* for November, 1927, a number of observations were made during April of this year, of the actual prevailing pressure difference as found in the University Hospital at Ann Arbor. These data have been taken chiefly for the purpose of ascertaining the feasibility of the plan, and represent manual observations for periods of about 20 min. at each station, at 1-min. intervals. The readings obtained do not represent extreme conditions of either wind or temperature difference, although on one day a wind velocity of over 20 miles per hour was recorded by the anemometer at the University Observatory. Some of the averages of the readings are given in the table:

AVERAGES OF SOME READINGS, OF PRESSURE DIFFERENCE ACROSS WINDOWS OF UNIVERSITY HOSPITAL, ANN ARBOR, AS OBSERVED ON THREE DIFFERENT DAYS AT CORRESPONDING STATIONS AT SECOND AND SIXTH FLOORS

Pressure Difference in Inches of Water

Date	Average Wind Velocity	Station A		Station B		Station C	
		2nd Floor	6th Floor	2nd Floor	6th Floor	2nd Floor	6th Floor
Apr. 17	5.3	+ 0.009	+ 0.013	+ 0.020	+ 0.003	+ 0.024	— 0.036
Apr. 18	11.3	+ 0.006	— 0.007	+ 0.054	+ 0.001	+ 0.010	— 0.037
Apr. 19	21.0	+ 0.516	+ 0.380	+ 0.060	+ 0.037	+ 0.159	+ 0.099

In the above table the plus (+) sign indicates tendency for inflow, and minus (—) sign, outflow.

It will be noticed that the pressure difference varies widely, the values ranging all the way from — 0.037 to + 0.516, the latter value corresponding to an equivalent wind velocity of about 33 miles per hour. It is significant that in every case, except one, the inflow tendency at the second floor was always greater than that at the sixth floor, indicating the activity of temperature difference, and probably also the influence of a fan ventilation system serving a part of the building. The height between the second and sixth floors is about 45 ft., and the outside temperature was about 40° F. A recording device is being made whereby more extensive observations can be carried on.

Due to the fact that there is not a constant definite relation between the difference in pressure between the outside and inside face of all windows and the velocity of the wind, as measured at some observation point, one must hesitate to use the definite pressure difference as being equivalent to the assumed wind velocity. This is particularly true if this is transferred to infiltration and in turn to B.T.U.'s. In other words, one cannot assume with accuracy that there always is an actual saving in B.T.U.'s required to heat the infiltering air comparable to the difference in leakages shown on the curves.

Relation of Infiltration to Heating and Ventilation

It is common practice, to provide additional direct heating surface to supply the heat necessary to warm the cold infiltrating air to room temperature and to charge up the installation of extra radiation and the heat consumed therein, as a loss attributed to infiltration. But infiltration is ventilation and, within reasonable limits, it would seem that this heat should be charged to ventilation. This is exactly what is done automatically in naturally ventilated buildings. With considerable wind, the ventilators on the windward side are closed; inflowing air on that side is reduced to infiltration which then becomes the only means of ventilation. The heat employed in warming the incoming air is not a loss but is chargeable to ventilation. In a building that is mechanically ventilated, there appears to be no good reason why the amount of cold air drawn in by the fan and heated up should not be reduced as infiltration increases on a windy day.

Every building should have adequate ventilation which usually means exchanging inside for outside air. If a naturally ventilated building had windows perfectly air tight against infiltration, some windows then would have to be opened to provide the necessary air for ventilation during the hours of occupancy. In a mechanically ventilated building it is equally true that if windows were perfectly air tight, the fans would have to draw in more outside air to be heated up to compensate for the loss of ventilation by infiltration.

Previous Estimates of Oil Supply Too Low

Notwithstanding the increased demands, due to the popularity of the automobile and the domestic oil burner, our petroleum reserves should prove ample for generations to come. Modern methods of production, improved equipment, and new methods for preventing waste, contradict earlier predictions of an oil famine.

These statements are made by the Oil Heating Institute in a booklet, "What About the Supply of Oil Fuel?," recently published. Since 1859, 10,000,000,000 barrels of petroleum has been produced in America. With new recovery methods applied to the old fields it is probable that the amount of oil taken from them alone will reach the enormous amount of 30,000,000,000 barrels. This means that at the present rate of consumption we shall have 35 years' supply from this source.

Mexico has large pools of petroleum, and Colombia and Venezuela are yielding great quantities of oil from fields that have just begun to be developed. In Persia, Mesopotamia, and Russia there are unimaginably large deposits of oil.

Modern methods of production have been applied with such success in the United States that certain fields in Pennsylvania, after having been worked for 68 years, now are being drilled with productive results. There are fields in Oklahoma and California that have been producing oil in the same large amounts, year after year.

Government experts have figured that, in the past, evaporation at the fields was responsible for a loss of 8.6%. This loss has been greatly reduced by improvements in storage facilities.

The fact that our comfort and prosperity are so closely linked with petroleum products has stimulated geologists and scientific experts in turning their attention to the discoveries of new fields. There has been a tremendous development in what might be called petroleum geology.

Estimates of reserves made as late as 1926 already have been proved far too low. In 1921, the United States Geological Survey made estimates of the future reserves of oil in the United States. In that report it was estimated that California would produce 1,850,000,000 barrels of petroleum. But California has already produced, in only six years since the report was made, over one-third of its estimated possible production, and is still producing with no diminution of supply. And, by 1930, California alone will have produced more oil than the entire visible supply was supposed to be in 1923.

In a statement made not long ago, Walter C. Teagle, president of the Standard Oil Company, said: "I have full faith in the ability of the oil industry to meet the growing demands for oil for domestic heating purposes. The experience of the last generation plus the best forecast which science can make for the coming generation justifies such faith."

Present Practice in Vapor Heating

16. The Adsco System

Previous articles in this series are:

1. *Webster Type R Modulation System, August*, 1926.
2. *Dunham Home Heating System, August*, 1926.
3. *The Illinois System, September*, 1926.
4. *Hoffman Controlled Heat, September*, 1926.
5. *The Mouat System, October*, 1926.
6. *The Trane System, November*, 1926.
7. *The Saroo System, December*, 1926.
8. *The O-E Perfect 3-in-1 System, January*, 1927.
9. *The Gorton System, February*, 1927.
10. *The Barclay System, May*, 1927.
11. *The Richardson System, June*, 1927.
12. *The Barnes & Jones System, July*, 1927.
13. *The Broomell System, November*, 1927.
14. *The Hutchison System, May*, 1928.
15. *The Veco System, August*, 1928.

VAPOR heating, as exemplified by the Adsco system, developed and manufactured by the American District Steam Company, North Tonawanda, N. Y., is illustrated, as far as general arrangement is concerned, in the oblique projection, Fig. 1. Steam, in the form of vapor, rises from the boiler to the radiators under approximately 5-oz. pressure in normal weather conditions. The essential devices consist of a modulating radiator valve, a return elbow, an air eliminator, a special damper regulator, a safety valve and a retard pressure-gauge graduated in ounces.

General Arrangement

The piping is preferably run in loop form, as shown in Fig. 1, and the steam supply is designed to grade down from the boiler to a low point, where there is installed a drip and seal; the return lines are graded down towards the boiler. The system is operated with pressures ranging from 2-oz to 6-oz. and is designed to avoid complicated mechanical devices.

The Adsco radiator valve is placed at the top inlet of the radiator, and is of the graduated, packless type for modulation use, as illustrated in Fig. 2. This valve is designed to effectually control the amount of steam entering the radiator. A slight turn of the valve handle increases or decreases the flow of steam. The valve opens fully with a three-quarter turn of the handle. A pointer indicates to what proportion the valve is open. An orifice insert is provided in this valve and so calibrated that with radiation properly set and with 5-oz. pressure at the valve, 80% of the radiator will be filled with steam when the valve is fully open, the lower portion of the radiator acting as economizer surface to extract the heat from the condensate before it passes into the return lines. Insert orifices are graded in steps of 5 sq. ft. from 20 sq. ft. to 130 sq. ft., and in steps of 10 sq. ft. from 130 sq. ft. to the largest size of 200 sq. ft. (see Fig. 3). This sizing permits fine gradation with all radiator sizes.

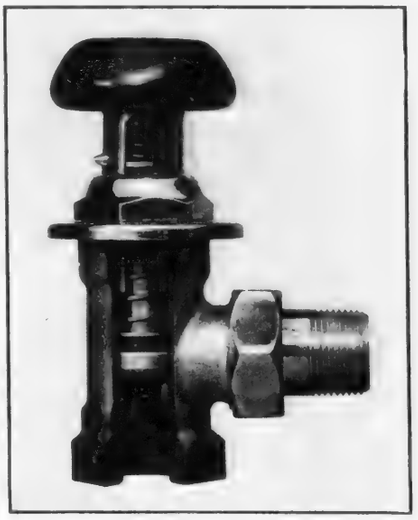


Fig. 2. Adsco Graduated Packless Type Radiator Valve

Owing to the close control exercised by the modulating valve, it is possible to have an open return connection, as the amount of steam admitted to the radiator, under proper pressure, is never sufficient to reach the return elbow. This unobstructed return outlet is an aid to quick heating of the radiator and eliminates troubles from dirt and scale in the return connection.

At the bottom of each radiator, at the opposite end from the inlet valve, is fitted a simple return elbow, especially designed to permit free outlet for condensate and air.

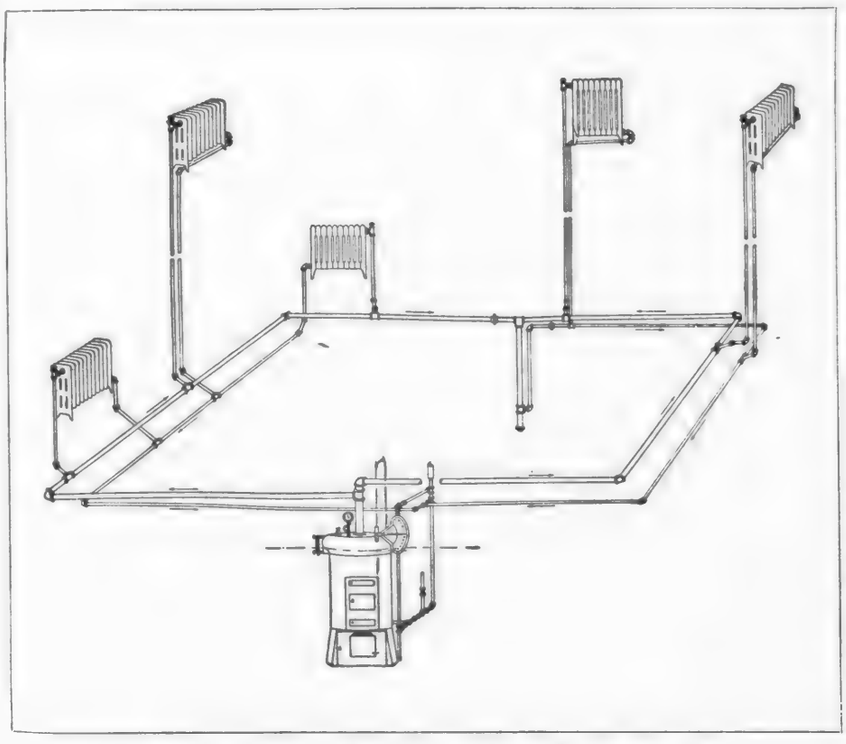


Fig. 1. Preferred Layout for Adsco Vapor Heating System

Air Elimination

Air is eliminated from the system by means of an Adsco air eliminator. This device is provided with a ball check which prevents air, once it has been discharged, from re-entering the system, consequently the fire in the boiler can be allowed to subside and the system operated on a partial vacuum. The air eliminator allows an unrestricted escape of air but is so designed as to positively close against steam and water, thereby obviating the danger of forcing the water out of the boiler on account of careless operation.

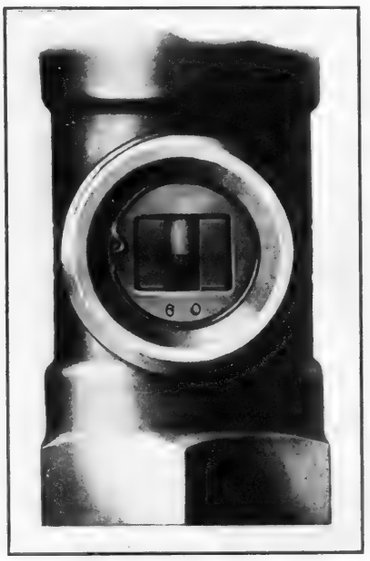


Fig. 3. Orifice Used for Individual Radiators in Adsco System

Pressure on the boiler is kept uniform by the Adsco damper regulator (Fig. 4). This consists of a weighted copper float inside of a cast-iron case. The float rides on the surface of the water in the case, the level being the same as the boiler water-line except when there is pressure in the boiler. By means of chain connections to the draft and check damper, the rising and falling of the float regulates the draft. When the boiler pressure increases, the water level in the damper regulator is raised, lifting the float and lever, which in turn closes the draft and opens the check damper, checking the fire in the boiler.

For large buildings and pressure systems, Adsco radiator traps of bellows type can be substituted in place of the return elbows.

Adsco systems also are designed for use in connection with steam supplied by district heating systems, a pressure-reducing valve being used to maintain a uniform pressure.

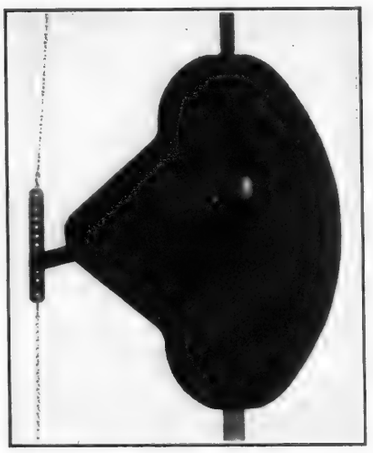


Fig. 4. Cutaway Adsco Damper Regulator

Advance List of Heating and Ventilating Exhibitors at Power Show

THE exhibitors of the Seventh National Exposition of Power and Mechanical Engineering to be held at the Grand Central Palace, New York, December 3-8, have engaged approximately 180,000 sq. ft. of floor space, and it is expected that the show will occupy the entire four floors of the palace devoted to such expositions.

A large number of exhibits will be of interest to those engaged in the heating and ventilating industry, and in addition there will be programs of motion pictures; seven firms already have signified their intention to show films featuring either their products or company activities.

Heating and Ventilating Exhibitors Complete to October 1

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Advance Engineering Co., New York.
Aerofin Corp., Newark, N. J.
Alexanders Brothers, Inc., Philadelphia.
American Blower Co., Detroit, Mich.
American Brass Co., Waterbury, Conn.
American Metal Hose Co., Waterbury, Conn.
American Oil Pump & Tank Co., Cincinnati, O.
American Pipe Bending Machine Co., Boston, Mass.
American Radiator Co., New York.
American Society of Mechanical Engineers, New York.
Ames Pump Co., Inc., New York.
Armstrong Machine Wks., Three Rivers, Mich.
Atlantic Metal Hose Co., New York.
Atwood & Morrill Co., Salem, Mass.
Auburn Stoker Corp., Auburn, Ind.
Badger & Sons Co., E. B., Boston, Mass.
Barnes & Jones, Boston, Mass.
Belfield Co., H., Philadelphia, Pa.
Boiler & Stoker Engineering Co., Inc., New York.
Bristol Company, The, Waterbury, Conn.
Brooklyn Borough Gas Co., Coney Island, New York.
Brooklyn Union Gas Co., Brooklyn, N. Y.
Brown Instrument Co., Philadelphia, Pa.
Builders Iron Foundry, Providence, R. I.
Bundy Steam Trap Co., Bayonne, N. J.
Byers Co., A. M., Pittsburgh, Pa.
Carrier Engineering Corp., Newark, N. J.
Cash Co., A. W., Decatur, Ill.
Century Electric Co., St. Louis, Mo.
Connery & Co., Inc., Philadelphia, Pa.
Consolidated Gas Company of New York.
Cork Foundation Co., New York.
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
De Bothezat Impeller Co., Inc., New York.
D'Este, Julian, Co., Boston, Mass.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Domestic Stoker Co., New York.
Dunham Co., C. A., Chicago, Ill.
Farnsworth Co., Conshohocken, Pa.
Federal Gauge Co., Chicago.
Fitzgibbons Boiler Co., Inc., New York.
Frank Heater & Engineering Co., Inc., O. E., Buffalo, N. Y.
Fuel Oil, New York.
Garlock Packing Co., Palmyra, N. Y.
General Electric Co., Schenectady, N. Y.
Gillis & Geoghegan, Inc., New York.
Grinnell Company, Inc., Providence, R. I.
Hardinge Co., York, Pa.
Heat Transfer Products Inc., New York.
Heating and Ventilating Magazine Co., The, New York.
Hill Co., E. Vernon, Chicago.
Hoffman Specialty Co., Inc., New York.
Illinois Engineering Co., Chicago.
Insulating Products Corp., New York.
Iron Fireman Automatic Stoker Corp., New York.
Johnson Service Co., New York.
Keating Pipe Bending & Supply Co., E. F., New York.
Kewanee Boiler Co., Inc., Kewanee, Ill.
Kieley & Mueller, Inc., New York.
King-Seeley Corp., New York.
Kings County Lighting Co., Brooklyn.
Korfund Co., Inc., New York.
Landis Machine Co., Waynesboro, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
Lincoln Electric Co., Cleveland, O.
Linde Air Products Co., New York.
Liquidometer Co., Inc., Long Island City.
McQuay Radiator Corp., Chicago.
Marsh & Co., James P., Chicago.
Mason Regulator Co., Boston, Mass.
Midwest Air Filters, Inc., Bradford, Pa.
Milburn Co., Alexander, Baltimore, Md.
Modine Mfg. Co., Racine, Wis.
Nash Engineering Co., South Norwalk, Conn.
National Regulator Co., Chicago.
New York & Richmond Gas Co., Stapleton, S. I., N. Y.
Northern Equipment Co., Erie, Pa.
Nugent & Co., Wm. W., Chicago.
Perkins & Son, Inc., B. F., Holyoke, Mass.
Powers Regulator Co., Chicago.
Preferred Utilities Co., Inc., New York.
Public Service Gas Co. of N. J., Newark.
Quigley Furnace Specialties Co., New York.
Ray Mfg. Co., W. S., San Francisco, Cal.
Raymond, F. I., River Forest, Ill.
Reading Iron Co., Reading, Pa.
Reeves Pulley Co. of N. Y., Inc., New York.
Reliance Electric & Engineering Co., Cleveland, O.
Ric-wiL Co., Cleveland, O.
Riley Stoker Corp., Worcester, Mass.
Rome Brass Radiator Corp., New York.
Sarco Co., Inc., New York.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Shaw Co., Benj. F., Wilmington, Del.
Spencer Turbine Co., Hartford, Conn.
Standard Oil Co. of N. Y., New York.
Staynew Filter Corp., Rochester, N. Y.
Stockham Pipe & Fittings Co., Birmingham, Ala.
Sturtevant Co., B. F., Boston, Mass.
Swartwout Co., The, New York.
Sweet & Doyle Foundry & Machine Co., Troy, N. Y.
Taco Heaters, Inc., New York.
Tagliabue Mfg. Co., C. J., Brooklyn, N. Y.
Taylor Instrument Companies, Rochester, N. Y.
Toledo Pipe Threading Machine Co., Toledo, O.
Torchweld Equipment Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Van Dorn Electric Tool Co., Cleveland, O.
Vinco Co., Inc., New York.
Webster & Co., Warren, Camden, N. J.
Webster Tallmadge & Co., New York.
Wood Mfg. Co., John, Conshohocken, Pa.
Wright-Austin Co., Detroit, Mich.
"X" Laboratories, New York.

How Would You Do It?

Question No. 14

A factory situated in a northern city has a steam heating system designed for weather at —10° with 70° inside. There is 3200 sq. ft. of radiation in the building with an additional piping load of 20%. The heating plant is operated for 16 hrs. a day, 7 days a week; the fuel used is bituminous coal with a heating value of 12,800 B.T.U. per lb. Assuming a standby loss of 15%, and that performance charts are available for the boiler used, together with degree-day data, how much fuel will be used in a normal heating season of 6450 degree-days?

	Degree Days	Average Outside Temperature Deg.
October	434	51.
November	789	38.7
December	1137	28.3
January	1296	23.2
February	1086	26.2
March	905	35.8
April	537	47.1
May	266	56.5
	6450	

The performance curve for this boiler shows the following efficiencies at the outputs specified:

Sq. Ft.	Efficiency Per cent
500	42
1000	52
2000	60
3000	65
4000	72
5000	63

THE average monthly outside temperatures are given in the table together with the degree-days by months. If the latter only is available, the average temperature can be determined. Using December as an example: this month had 1137 d.d. Since a degree-day, by definition, is the product of one day and the temperature difference between the average daily outside temperature (below 65°) and 65°, we have

$$N\ (65 - A) = D$$

where

N = number of days per month
A = average outside temperature
D = degree-days per month

Solving for A we have:

$$A = \frac{65N - D}{N}$$

so that for December

$$A = \frac{(65 \times 31) - 1137}{31} = 28.3°$$

average outside temperature for December. In case neither the degree-days nor the average outside temperature is known, they both can be worked out from weather bureau records.

Since the system was designed for a maximum temperature difference of [70° — (— 10°)] or 80°, the per cent of installed rating developed by the boiler in the month of December, with an average outside temperature of 28.3°, will be

$$\frac{70° - 28.3°}{80°} = \frac{41.7°}{80°} = 52.1\% \text{ of}$$

installed rating.

The load on the boiler is 3200 sq. ft. plus 20% for piping, or a total of 3840 sq. ft. By months, the load on the boiler will be the rated load times the per cent of rating required for the average outside temperature for that month. For December, this load would be

3840 sq. ft. × 0.521 = 2000 sq. ft.

Each month is worked in the same way; first, by finding the per cent of rating developed for that month by using the outside temperature, and then multiplying the load, 3840 sq. ft., by the percentage. Following this through, we obtain the following loads for the season:

	Max. Load		Per cent demand		Sq. ft. Actual load
October	3840	×	0.238	=	915
November	3840	×	0.391	=	1503
December	3840	×	0.521	=	2000
January	3840	×	0.585	=	2245
February	3840	×	0.547	=	2100
March	3840	×	0.427	=	1640
April	3840	×	0.286	=	1100
May	3840	×	0.169	=	650

The table presented with the problem gives the boiler efficiencies at various loads. By interpolating, using the table and the loads given above, we find the monthly boiler efficiencies to be:

Month	Efficiency
October	50.3
November	56.0
December	60.0
January	61.2
February	60.5
March	57.1
April	52.8
May	45.0

Heat demand per month will be (load in sq. ft. × B.T.U. emitted per sq. ft. of radiation per hour × hours the system operates per day × days per month) + (15% of the foregoing for standby loss).

This, for October, will be

(915 × 240 × 16 × 31) 1.15 = 125,400,000 B.T.U. per month.

Dividing this by (efficiency of the boiler per month × the heat value of the coal per pound) will give the coal consumption in pounds for October:

$$\frac{125{,}400{,}000}{12{,}800 \times 0.503} = 19{,}500 \text{ lbs. coal used}$$

in October.

Working these out in the same way, using the monthly load, the monthly efficiency, and the days per month for each different month, we have:

Month	Coal Consumption Lbs.
October	19,500
November	27,800
December	35,600
January	39,300
February	33,600
March	30,700
April	21,600
May	15,500

Total for the heating season 223,600 lbs., or 111.8 tons.

Coldest Day May Not Require Most Fuel

A study of twelve house-heating installations in the city of Detroit, during the past winter, showed that the maximum day, so far as load was concerned, did not occur on the coldest day of the season. The temperature on the maximum load day dropped to 6° above zero, while the minimum temperature on the coldest day of the winter was 2° above zero. On the maximum load day, although it was not the coldest day, it was found that the wind velocity reached 39 miles per hour, as compared with a velocity of 24 miles per hour on the coldest day of the season. Consequently, it appears that periods of greatest consumption result from a combination of high winds and low temperature.

The study was made by F. J. Woolfenden, superintendent of the pressure department of the Detroit City Gas Company, and the results were presented in full before the annual meeting of the Michigan Gas Association. Experiments also were made with a warm-air installation in a six-room brick and stucco house, a two-story structure with attic, 28 ft. x 30 ft. in plan, with 2 in. of insulation over the ceiling of the second story, and weatherstripped throughout. From 10:30 P.M. to 5:00 A.M. the thermostat was set to maintain 60°, and 72° throughout the day and evening. Later the thermostat was set to maintain 72° throughout the 24-hour period. Upon examination of the demand charts it was found that substantially the same amount of gas was consumed for the 24-hour period under either condition. In those cases where the temperature was reduced at night, a continuous demand occurred from 5:00 A.M. until after 6 o'clock, and from 7 A.M. until 10:30 P.M. the burners were on longer than 30 minutes at a time. When the 72° temperature was maintained thruout the 24-hour period no such continuous demand existed.

Oil-Burner Held at

JOHN Wanamaker, New York, one of the country's largest department stores, held its First Exposition of Automatic Oil Burners in the New York store August 27 to September 15. Co-operating with the Oil Heating Institute and the manufacturers of nine domestic oil burners, the store not only maintained an exhibit of burners, with salesmen and engineers from the factories to explain their construction and operation to those interested, but also had speakers of national prominence every afternoon, the talks being broadcasted from the radio station WHN.

The exposition was significant in that the entrance of an internationally known store into the oil-burner marketing field indicates that business executives who are constantly in touch with the desires of the buying public realize the tremendous possibilities in the oil-burner field.

Miss Katherine Fisher, director of Good Housekeeping Institute, in her talk, "The Home Manager and Her Heating Plant," said that ". . . as home managers the ideal heating system is one that we can depend upon day in and day out, one that gives the temperature we want within close limits and this without care or attention on our part. The heating of the house, therefore, must be entirely automatic to the extent that we can forget it as one of our problems. In other words, we want a heating service as well as a heating plant. We are glad to know then that the present trend in heating systems is in the direction of that ideal plant. Automatic stokers for coal-burning furnaces, and mechanically controlled equipment for handling the so-called quick fuels like oil and gas, together with automatic control of temperature, are making this ideal a reality."

Commenting on the results of a survey of domestic oil heating made by the Popular Science Institute, Dr. Collins P. Bliss, associate dean, College of Engineering, New York University, in his talk "What the Popular Science Institute Has Learned About Oil Burners," said:

"Oil burning, the only radically different system of home heating that has been developed in the last quarter of a century, does more to relieve drudgery than the services of two handy men. This has been established definitely by a thorough investigation conducted by Popular Science Institute into the performance of burners actually in operation. More than 6000 operating years were recorded and tabulated, covering burners in 300 cities in 28 states. More than 90% of the users found them clean, efficient and safe. In my judgment, liquid fuel is the safest form of domestic heat. And this judgment is based not only on our own tests and investigations but also upon reports of the Underwriters' Laboratories toward lessening fire hazard."

Exposition Wanamaker's

Women have been brought into the petroleum picture by the rapid growth of the oil-heating equipment industry within the past few years, and that they will be an increasingly important factor in the petroleum merchandising problems, was the opinion of Harry F. Tapp, technologist of the American Oil Burner Association. In his talk on "Heating Facts for the Home Owner," Mr. Tapp stated that "the petroleum interests today see in the home, dominated by feminine influence, one of their greatest markets. At its last annual meeting, the American Petroleum Institute, representing the principal oil producers of the country, declared that the petroleum resources of the United States were ample to satisfy the growing demand for oil for domestic heating purposes and appointed a committee to co-operate with the Oil Heating Institute in educating home-owners to the advantages of oil heating. The attitude of the large oil producers is reflected, too, in the announcement, more recently, by two of the Standard Oil companies that they were ready to take orders from home-owners for two-year supplies of fuel oil."

Among the other lectures were:

"Operating the Furnace with an Electric Button," by Charles K. Nichols, New York Edison Company.

"A New Era in The American Home —The Age of Liquid Fuel," by Leod D. Becker, managing director, American Oil Burner Association.

"Heat by the Gallon," by A. E. Coburn, associate editor, Fuel Oil Journal.

"Practical Hints on Home Heating," by P. E. Fansler, associate editor, THE HEATING AND VENTILATING MAGAZINE.

"What Price Comfort?" by M. E. Simpson, chairman, Dealers' Division American Oil Burner Association.

"The Last Word in Home-Heating Equipment," by T. S. McGrath, engineer, Oil Heating Institute.

"Healthful Heating," by Dr. W. W. Peter, associate secretary, American Public Health Association.

"Oil Heat, the Automatic Servant," by C. A. Ott, business manager, Fuel Oil Journal.

"Heating a Model Home," by Mrs. Charles E. Gregory, president, New York State Federation of Women's Clubs.

"The Machine Age Invades the Home," by Mrs. Mildred M. Bentley, director, Delineator Home Institute.

"Why It Pays to Install Oil Heating," by E. E. Newsom, assistant director, Oil Heating Institute.

The nine oil burners on display at the exposition, were the A.B.C., Caloroil, Electrol, Marr, Petro, Preferred Hart, Quiet May, Super Oil Heator, and Timken. One company reported the sale of two machines from the floor and 125 inquiries.

Glancing Backward

High Lights in the Evolution of Leaders in the Heating and Ventilating Industry

VIII—American Blower Corporation

A HALF-CENTURY ago the firm of Huyett & Smith, a co-partnership, hung out its shingle in the month of November, 1881, in the city of Detroit. The location of the factory was at Russell and Harper Streets—the present plant of the American Blower Corporation is situated on the same spot. W. D. Smith, a shop foreman, in the lumber mill of M. C. Huyett, had invented a fan to exhaust the shavings from the mill, and this device formed the basis of the business.

Beginning with that exhaust fan, which today would pass for a mechanical freak, new lines have been added from year to year until the company now manufactures fans, blowers, ventilators, heaters, air-washers, drying equipment, engines, and traps.

The "new and useful" fan which Mr. Smith invented was designed for planing mills. The peculiar feature of it was that it had two housings, or rather, the housing was split in two by a partition, the theory being that the wheel was enabled to "empty itself twice in one revolution." It is seen, therefore, that claims of extraordinary qualities or efficiencies are not a novelty in technical literature. Mr. Smith's activities were not alone confined to the shavings fan. In fact, the name Smith seems to have been the trade name of the new firm, for there was the Smith Ventilating Fan, the Smith Dixie Blower, the Smith Steel-Plate Steam Fan, the Smith High-Speed Vertical Engine, the Smith Hot Blast Apparatus. The Smith Patent Water-Tube Boiler was a departure that evidently met with no great success.

In 1882, because the business was meeting with a measure of success, the company was incorporated with a capital of $100,000 under the name of the Huyett & Smith Mfg. Company. Mr. Huyett only retained his connection with the company until February 2, 1884, and following his resignation, D. M. Ferry, the famous Detroit seed man, was made president.

The Late Sir Samuel C. Davidson, Inventor of "Sirocco," and James Inglis, now President of the American Blower Corporation

Along in the year 1890, James Inglis acquired some stock in the company and was made treasurer. Three years preceding the advent of Mr. Inglis, Fred R. Still came down from the Saginaw saw mills, while some of the Michigan pines were yet standing, and took a job with the young company as a draftsman. Mr. Inglis has been president of the company since 1907, while Mr. Still now is vice-president in charge of export.

Following the recovery of the country from the money panic of 1893, the company began to make real progress. In 1902 the capital was raised to $300,000; in 1907, it was made $500,000, and, in 1909, when the company was again reorganized, the capital was raised to $1,500,000. Mr. Smith, the inventor of the original exhaust fan, remained with the organization until the name of the company was changed to the American Blower Company, coincident with incorporation in Michigan October 11, 1895. In 1900, F. W. Whiting was made president, succeeding Mr. Ferry. He remained in this capacity until 1907, when Mr. Inglis was elected to this office.

Early in the twentieth century, rumblings were heard in the fan industry of a strange European fan that would do impossible things. A tea-grower in far-off India, Samuel C. Davidson, had become interested in the problem of air handling and had invented what was considered an entirely new departure in the design of blowers. He immediately proceeded to protect his invention by strong patents in every civilized country in the world. In 1904, at the World's Fair in St. Louis, the Sirocco fan, made by Davidson & Company, Belfast, Ireland, was exhibited. A small Sirocco fan was set up to blow against one of the large steel-plate fans then in general use. The results of the contest between these two fans could hardly be said to be favorable to the steel-plate fan, and, to the public, the fact was patent that the Sirocco, Lilliputian as it was, got the decision every time the power was turned on.

Sirocco Invades This Country

Following the fair, the Irish company organized an American company with a factory at Troy, N. Y., under the name Sirocco Engineering Company. The engineering world immediatiely took notice. There was no questioning the advantages the "turbine" type fan had over the "paddle-wheel" fan in speed, horse-power, and space requirements. Practically every manufacturer took steps to discard the steel-plate fan for ventilating work and to design a fan that would approximate the results obtained by the use of the new Sirocco. The American Blower Company, feeling that it was unable to surpass the product of the new organization, took the famous historical advice and "jined 'em." In 1909, the Sirocco Engineering Company was consolidated with the American Blower Company of Michigan, the new organization being known as the American Blower Company of New York.

The Honorable William C. Redfield, later member of Congress and Secretary

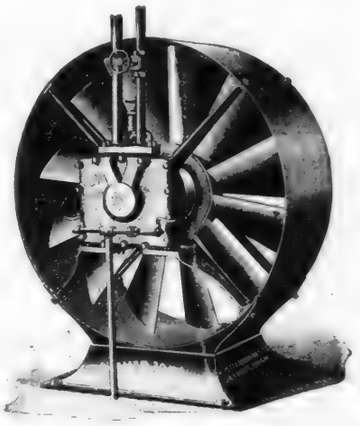
of Commerce in President Wilson's Cabinet, was the head of the Sirocco Engineering Company, and came into the new American Blower Company as second vice-president in charge of export, retaining the position until he entered President Wilson's Cabinet.

The name Sirocco, well-known in the heating and ventilating industry today, no doubt originated with Mr. Davidson while in India. Sirocco is defined as "a southeasterly wind," and is a commonly used term in southern Europe and Asia. Thus even the name of a product used in every-day American industry can be traced back to one man's association with the life of India.

Personnel

In 1902, Harry Ebel took a job with the company as a draftsman, and with the exception of a short intermission, has been with it ever since. He is at present works manager and assistant treasurer. J. F. G. Miller "joined up" in 1906 as a student salesman, and has been successively, salesman, district manager, sales manager, general manager and vice-president and treasurer. W. A. Rowe left the Buffalo Forge Company in 1908, in the days when taking employees from competitors was considered one of the fine arts. He is at present chief engineer.

Rawson Vaile, the company secretary and Clark T. Morse, sales manager, joined the company in the comparatively recent year of 1912. Mr. Morse was, at one time, a salesman with the Sturtevant Company and later on with the Canadian Sirocco Company, Ltd., an A. B. C. subsidiary. He was manager of the Chicago office of the company for seven years. Mr. Vaile was export manager and then served in Washington during the war. E. P. Jeffery, general superintendent, reported for work as a wheel builder in 1911. Prior to that he manipulated an "old man" for a boilermaker in the Port Huron shops of the Grand Trunk Railroad.



The Smith Steel Disc Ventilator Fan as Patented in 1886

In 1910, Charles H. Gifford, formerly of the B. F. Sturtevant Company, became vice-president of the American Blower Company, retiring in 1918.

The American Blower Company was consolidated with the American Radiator Company in 1927, and the American Blower Corporation was formed. The officers are: James Inglis, president; J. F. G. Miller, vice-president and treasurer; C. T. Morse, vice-president and sales manager; F. R. Still, vice-president; Rawson Vaile, secretary; Harry Ebel, assistant treasurer.

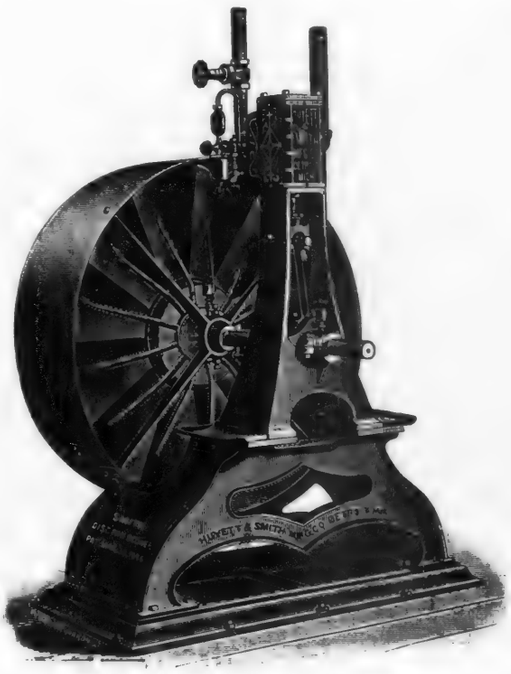
Service Record

The following employees have been twenty-five years or more with the company:

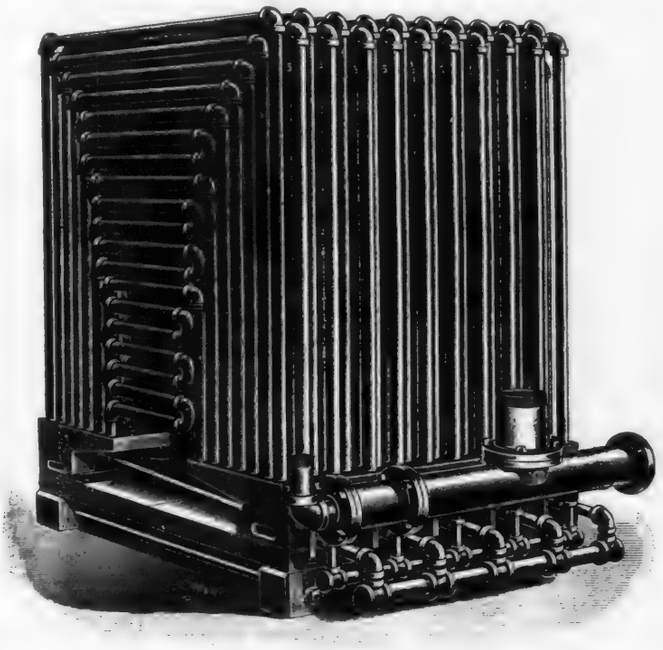
C. M. Cunliffe, 45 years—pensioner
F. R. Still, 41 years, vice-president in charge of export
James Anderson, 41 years, truck driver
E. L. Krome, 42 years, head of service department
James Inglis, 38 years, president
Mary E. Oliphant, 33 years—on leave of absence
Charles Goetsch, 31 years, inspector
Chris Kirn, 32 years, fan builder
John Armstrong, 30 years, foreman
Hiram Wilson, 30 years, watchman
Peter Grabowski, 29 years, elevator operator
Jacob Kretz, 27 years, fan builder
Benjamin Adams, 28 years, manager of Philadelphia office
Arthur Ritter, 27 years, manager of New York office

Present Branches

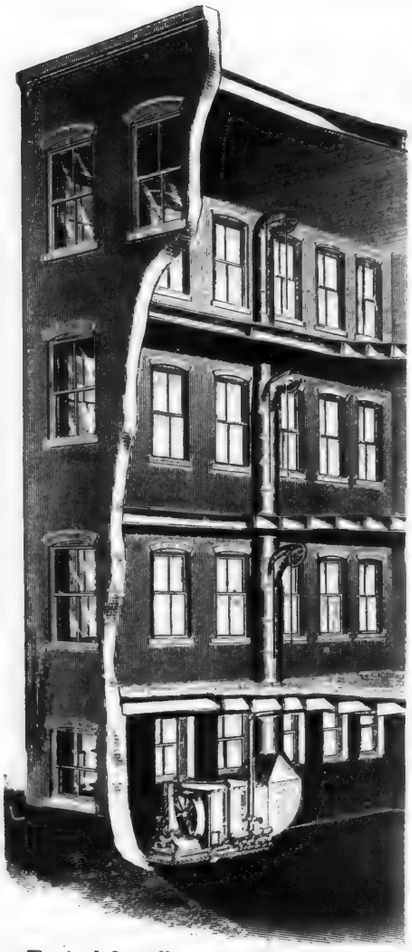
The company has forty-five sales offices located in the principal American cities, its export work being in charge of Vice-President Still at New York. The general offices of the corporation are located at Detroit with the main



"ABC" Disc Ventilating Fan with Direct-Connected Steam Engine, Showing Type of Fan Designed by W. D. Smith



Fan Blast Heater Coil of the Type Made by the American Blower Company, in 1896



Typical Installation of Fan System of the Type Used in the Nineteenth Century

works. Another plant is located at Bond Hill, Cincinnati, O. A subsidiary, the Canadian Sirocco Company has a factory at Windsor, Ontario. The corporation also maintains a number of warehouse stocks at various points.

New Directors for Associate Division, A. O. B. A.

As a result of its mail ballot, the American Oil Burner Association announces that H. W. Sweatt, of the Minneapolis-Honeywell Company, and L. A. M. Phelan, of the Absolute Con-Tac-Tor Corporation, were elected to the board of directors representing the associate division.

Chicago Oil Burner Association

The regular monthly meeting of the Chicago Oil Burner Association was held at the Allerton Club, September 11, with forty-five members and guests present. R. S. Beale, national sales director of Electrol, Inc., of Missouri, gave an address on Trade Practice and Ethics. Homer J. Buckley, of Buckley Dement Company, spoke on Sales.

Legal Decisions

Heating Company Held Not Liable to Owner for Defects in Thermostats Selected and Specified by Owner

A school district caused specifications to be prepared for the heating and ventilating equipment of a high school building. The specifications provided for thermostats of a design and make to be approved by the engineer, but did not specify any kind or make of thermostats. The successful bidder's proposal was expressly based on using the thermostatic equipment of a specified manufacturer. A formal contract was entered into, which specified this equipment as in the proposal. The equipment was installed, tested and found to be operating satisfactorily; and the work was accepted and final payment made to the heating company.

A few months afterwards the thermostats appeared defective, and, apparently after ineffectual attempts to remedy them, the district removed them and installed in their place thermostats of a different make and kind at a cost of $2,300, which, in the subsequent action, was assumed to be the reasonable value of the installation. The district then sued the heating company for damages for alleged defective installation, joining the surety on its bond, which was conditioned that the heating company should "save harmless and indemnify said school district from any defect or defects in any of the workmanship or materials entering into any part of the work covered by said contract which shall develop or be discovered within one year after the final acceptance of such work."

The Washington Supreme Court holds, Seattle School Dist. v. King Plumbing & Heating Company, 265 Pac. 463, that, since the formal contract expressly followed the bid in requiring a specific kind of thermostats, the general indemnity expressed in the bond, in pursuance of the specifications considered as a part of the contract, that the heating company should save harmless and indemnify the district for defects which should develop or be discovered within a year after acceptance of the work, did not require the heating company to respond in damages to the district for the cost of its installing a different kind and make of thermostats, as the district elected to do upon becoming dissatisfied with those specified in the bid and contract during the year following the completion and acceptance of the work.

The fact that the heating company chose to specify the particular thermostats in its bid did not change the force and effect of the express terms of the contract, by which the district ultimately elected to have these thermostats installed. As the heating company was not liable in damages, its surety was not.

Cost of Repair or Installation of Heating Plant as Between Co-owners of Property

A co-owner of real estate was authorized by the other co-owners to collect the rents and remit them their share, they to bear their proportionate part of the expense of keeping the property in repair. A lease of the property provided that the lessors should keep the property in a tenantable condition. When it was entered into, the building was equipped with a heating plant, and during the term of the lease the lessees could require that it be kept in repair. During the term of the lease the central heating company which was supplying the heat ceased furnishing heat, and it became necessary to repair the heating plant which had previously been used, or install a new one.

In an action by the co-owners for their share of rentals, the evidence tended to show that the old furnace, which had not been used for a number of years, could not be repaired, and that it was necessary to install a new one; but it did not show that the type of furnace which was installed was necessary to place the building in as tenantable a condition as it was when it was leased. While the owner who collected the rents was authorized to have such repairs made as would keep the building in a tenantable condition, he could not, it was held, without consulting his co-owners, install a particular type of heating plant if a less expensive type would place the building in as tenantable condition as it had theretofore been. A more expensive type of heating plant might be less costly to operate or might render the use of the building more convenient to the occupants, but the owners, without their consent, should not be charged with the additional cost of such a plant.—Suesskind v. Michael Hardware Company, Kentucky Court of Appeals, 2 S.W. (2d.) 1073.

OIL-FUEL SPECIFICATIONS OF THE A.O.B.A.

(*Continued from Data Sheet No. 48-M*)

Oil No. 6. Fuel Oil—Heavy

Scope.....1—This specification is that of the Federal Specifications Board for Bunker Fuel Oil "C" and covers a grade of fuel oil suitable for burners adapted to oil of high viscosity.

Properties...2—The oil shall conform to the following specifications: It shall be a hydrocarbon oil free from grit, acid and fibrous or other foreign matters likely to clog or injure the burner or valves. If required it shall be strained by being drawn through filters or wire gauze of 16 meshes to the inch. The clearance area of the strainers shall be at least twice the area of the suction pipe and the strainers shall be in duplicate.

(*a*) Flash Point:
Minimum—(Pensky-Martens Closed Tester).. 150° F.

(*b*) Water and Sediment, maximum..... 2.0%
A deduction in quantity will be made for all water plus sediment in excess of 1.0 per cent.

(*c*) Viscosity, Saybolt Furol at 122° F., maximum .....300 seconds

Methods of Testing[1]..3—The properties enumerated in these specifications shall be determined in accordance with the following methods of test of the American Society for Testing Materials:

(*a*) Flash Point:
Standard Method of Test for Flash Point by means of the Pensky-Martens Closed Tester (Serial Designation D 93).

(*b*) Water and Sediment:
Standard Method of Test for Water in Petroleum Products (Serial Designation D 95-27) (U S G S S Method 300.11) U. S. Government Standard Specification Method 300.2 for sediment.

(*c*) Viscosity—Standard Method of Test for Viscosity of Petroleum Products and Lubricants (Serial Designation D 88).

[1] In event changes are made in the Methods of Tests by the A. S. T. M. the current Methods of Testing is to be used rather than those mentioned in the specifications.

HEATING VALUES OF FUEL OIL

While an oil fuel of certain gravity obtained by distillation may differ in heating value from other oil fuels of exactly the same gravity, but resulting from cracking processes, and while an oil obtained from one part of the country may differ in heating value from an oil of the same gravity, but from a different part of the country, the values given below are based on thousands of tests made at the Kansas City Testing Laboratory (a commercial laboratory of high standards whose data are generally accepted in the oil industry), and should be used only as averages.

Gravity Deg. A.P.I.	B.T.U. per Gal.	B.T.U. per Lb.
10	156,033	18,650
11	155,263	18,690
12	154,484	18,730
13	153,706	18,770
14	152,948	18,810
15	152,228	18,850
16	151,517	18,890
17	150,769	18,930
18	150,068	18,970
19	149,285	19,010
20	148,635	19,050
21	148,012	19,090
22	147,305	19,130
23	146,664	19,170
24	145,959	19,210
25	145,385	19,250
26	144,717	19,290
27	144,069	19,330
28	143,432	19,370
29	142,897	19,410
30	142,222	19,450
31	141,660	19,490
32	140,040	19,530
33	140,406	19,570
34	139,884	19,610
35	139,324	19,650
36	138,764	19,690
37	138,177	19,730
38	137,656	19,770
39	137,125	19,810
40	136,575	19,850

Table from "Handbook of Petroleum, Asphalt and Natural Gas," by Roy Cross.

A New Journal for the Oil-Heating Industry

SPONSORED by the publishers of THE HEATING AND VENTILATING MAGAZINE, a new monthly journal is announced for the oil-heating industry. It will be known as *Oil Heat* and its scope will include the domestic, commercial and industrial phases of the subject. The first issue will appear November 1. *Oil Heat* will be edited by P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE.

Two factors have had a determining influence in inducing the publishers to establish a new journal devoted entirely to oil heating. One is that the best-informed business men and technicians in the oil-heating industry have declared that the year 1928 has witnessed the commercial and technical stabilization of their important industry and that the industry has come into its own, with a brilliant, substantial future before it.

The other is the expressed feeling on the part of important leaders in the industry that the industry now needs an authoritative, carefully-edited journal devoted to its further commercial and technical advancement along the presently-developing avenues, which will lead to continued stability and progress.

The fact that *Oil Heat* is to be directed by the publishers of THE HEATING AND VENTILATING MAGAZINE, which is now in its 25th year, is assurance that no effort will be spared to establish and maintain the new journal on the highest editorial and business plane. Its establishment comes at a critical point in the development of the industry, and the new journal may be expected to exert a strong and steady influence on the industry's further progress.

P. E. Fansler, editor of *Oil Heat*, is widely known in the industry through his years of service as associate editor of THE HEATING AND VENTILATING MAGAZINE and his many contributions, dealing with oil heating, which have appeared in other publications, both here and abroad, notably, *The Literary Digest*, *Architectural Forum*, *Garden and Home Builder* (now *American Home*), *Good Housekeeping*, *Popular Science Monthly* and *Country Life in America*.

Mr. Fansler was graduated from Purdue University in 1901, receiving his master's degree in 1903. While in the university, Mr. Fansler contributed to the *Lafayette* (Ind.) *Morning Journal* and thus early began his journalistic work which he has continued from time to time throughout an unusually active engineering career.

He was for some years assistant business manager, engineering department, J. G. White & Company, international financiers, builders and operators of public and private utilities, thus gaining an intensive business experience, combined with extraordinary engineering associations.

In 1910, Mr. Fansler became interested in the then new Diesel type of internal combustion engine and for many years was engaged in designing, testing and selling these engines, thus acquiring a technical knowledge concerning the utilization of oil fuel which, later, quite naturally led him to the oil-heating industry, provided with an unusually comprehensive experience directly related thereto.

In 1925, Mr. Fansler became associate editor of THE HEATING AND VENTILATING MAGAZINE, where his knowledge of and enthusiasm for oil heating could be projected over a wider field.

Heating and Piping Contractors National Association

Board of Directors Meet

The board of directors of the Heating and Piping Contractors National Association held its fall meeting at national headquarters, New York, September 17-18.

S. Lewis Land, of the apprenticeship department of the Plumbing and Heating Industries Bureau, conferred with the board on the subject of the training program for apprentices in the heating industry. The association will co-operate with the bureau in bringing to the attention of the heating contractors throughout the country the services which can be rendered in training the future journeymen.

The directors voted the usual contributions to the Research Laboratory of the American Society of Heating and Ventilating Engineers, and to the Plumbing and Heating Industries Bureau. Proposed simplification of hack-saw blades, wrought-iron nipples and steel nipples, as prepared by a conference under the auspices of the Department of Commerce, were submitted to the board for approval. Other subjects discussed included work of the boiler output committee, depreciation, and standards for piping and flanges.

Association Secretaries' Conference

Executives of local Heating and Piping Contractors Associations held a conference at the national headquarters, 50 Union Square, New York, September 17-18.

George M. Getschow, of Chicago, chairman of the sub-committee on boiler output, was present and explained the boiler selection data which has been sent out to members as Part II of the association's engineering standards. He then gave a brief outline of the history of the work of his committee and of the accomplishments up to the time of the conference. S. Lewis Land, of the Plumbing and Heating Industries Bureau, told the secretaries what his department was doing on the training schedules for apprentices, and also spoke on the standard text on steam fitting. Mr. Land then outlined the provisions of the Smith-Hughes Act, under which local associations can obtain governmental aid for vocational schools.

Twenty Cities Have Certified Heating

With the addition of two more local associations to the list of those licensed to use the National Certified Heating Insignia, there are now twenty cities in the United States in which contractors are qualified to guarantee their heating installations. The two local associations just added to the list are Greensburg, N. C., and Alameda County, Calif. Cities whose associations have been licensed are: Chicago, Cincinnati, Cleveland, Kansas City, Los Angeles, Memphis, Milwaukee, Newark, N. J., Norfolk, Philadelphia, Portland, Ore., Richmond, Va., San Francisco, Seattle, Sheboygan, Wis., St. Louis, Utica, and Washington, D. C.

Certified Heating Campaign Inaugurated in Milwaukee

Certified heating has been initiated in Milwaukee by the Heating and Piping Contractors Association of that city.

An engineering department has been established to handle the certification details of members' installations. In connection with the campaign, which will extend throughout Milwaukee County, special signs will be placed on or near buildings having certified heat installations.

New York City Association's Annual Outing

Bids, contracts and overhead were all forgotten for the time being by the members of the Heating and Piping Contractors New York City Association when they embarked on the good ship Doris at the foot of West 96th Street, New York, for their third annual outing, September 13, at Huckleberry Island on Long Island Sound.

Of the total of 54 members that attended the outing, thirty-three were in the party that sailed up the North River, past Spuyten Duyvil to the East River and thence up the sound. A buffet luncheon was served en route. Arriving at Huckleberry Island, the party found many of the members had preceded and were awaiting them. The island is owned by members of the New York Athletic Club and the privileges for the day were secured through the courtesy of J. A. Almirall, of the New York City association, and R. W. Rodman, superintendent of plant operation of the New York City Department of Education.

In spite of the sound of distant thunder, the events were run off under ideal weather conditions and it was a happy, but tired, party which embarked on the club's launch Indian for Travers Island as the last event had been concluded. The members sat down to a delicious shore dinner at the New York Athletic Club, where the winners of the different events were announced and the prizes awarded.

In addition to the individual competitions, the winners in each event were credited with points on the directors' cup, which is played for each year. Three of the members, Thomas Yockel, A. E. Anderson and Leon L. Munier, were tied at five points each. On the draw Mr. Yockel won the right to have his name inscribed on the cup as this year's winner. The winner last year was E. W. Verity.

Much credit for the success of the day was given to Executive Secretary William E. Taylor, and to the outing committee, consisting of R. C. Purvis, chairman, E. W. Verity, W. H. Johnston, Fred Landes, A. E. Anderson, Samuel Berman and Lewis Paulding.

Milwaukee Association Desires Catalogs

The Heating and Piping Contractors Milwaukee Association is desirous of building up a catalog file in its office, covering complete descriptive literature and engineering data on boilers, radiators, unit heaters, piping equipment, and specialties. All such literature received from manufacturers will be appreciated.

Oakland Association Organized

A local chapter of the Heating and Piping Contractors National Association has been formed in Oakland, Calif., and will meet weekly. Officers elected are: President, James Cummings; treasurer, Carl T. Doell, and secretary, George Schuster, of Berkeley. Gerald Hill, formerly associated with Hunter & Hudson, San Francisco, has been selected as manager.

Cleveland Offices Moved

Heating and Piping Contractors Cleveland Association has moved to Room 502, 1227 Prospect Avenue.

New Apparatus and Appliances

Manufactured Weather for the Home

THE Weathermaker, a complete unit for producing proper weather conditions in the home, is announced by the Carrier-Lyle Corp., 39 Cortlandt St., New York. This unit, long expected by those familiar with Mr. Carrier's activities in the heating and air conditioning industry, opens up a field of tremendous potentiality, and permits the home-owner to enjoy the same approach to perfection in atmospheric conditions in the home as is possible in the largest and most elaborately equipped theatre or school.

Air Circulated by Blower

Return air from the rooms enters at (A), and is drawn through the filters (B) by the blowers (C) driven by the motor (D). Once through the filters, the cleaned air passes through the interchanger (E) where it is warmed to the proper temperature. Heat is supplied to the interchanger by the gas-burner (J). After giving up heat to the interchanger, the products of combustion pass out through the back-draft diverter (K) to the flue (L), while the warmed air rises to (F).

Meanwhile, the water in the humidifier (G) has been heated to the temperature of vaporization. The water vapor and the warm air meet at (F) and the proper moisture content is established. From this point, the conditioned air passes into the mixing chamber (H), from which it is driven out through the duct system by the blower (C). Temperature control (M) is in the return-air duct, while (N) is the gas safety control and (P) the pilot safety control. The purpose of the gas safety control is to shut off the gas if any situation should occur that might cause overheating; the pilot safety control shuts off the gas if, from any cause, the pilot light should become extinguished.

Built to Resist Corrosion

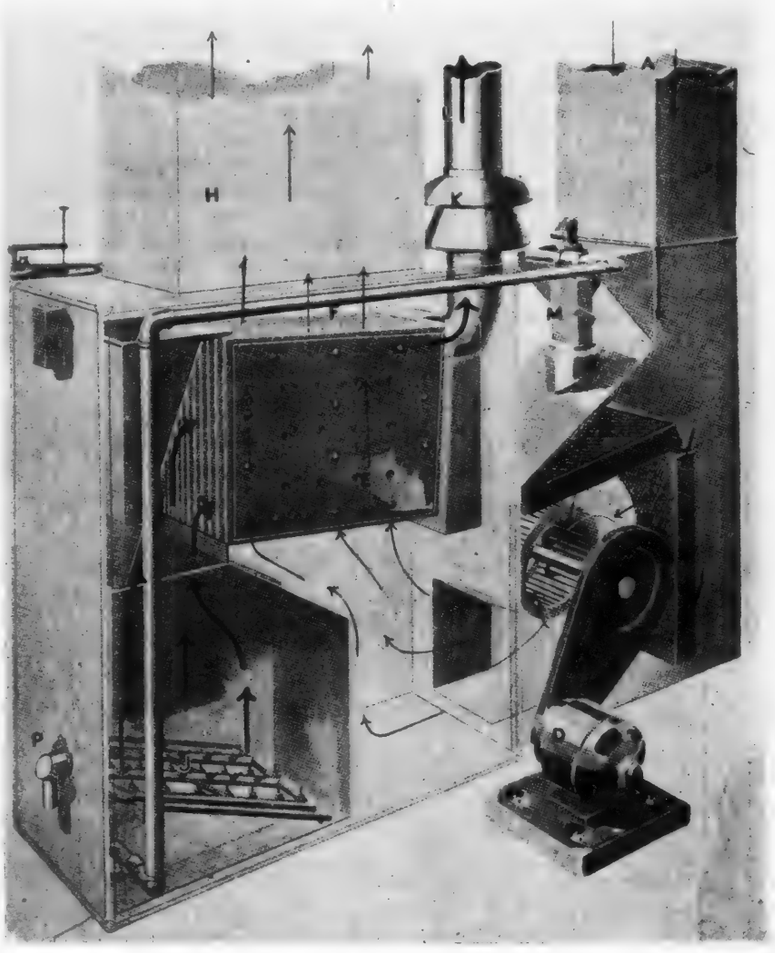
Chrome-nickel, low-carbon iron is the metal used throughout the combustion system; it is non-corrosive, and is not affected by the products of combustion. The outer covering is an insulated casing made of a material highly resistant to gases and ordinary rust. When asked how long the unit would last, the Carrier engineers replied that they did not know—the system is new. They did say that it was built to give long service, and that the workmanship is the same as that which goes into the large Carrier industrial system. So far as installation is concerned, Carrier engineers will personally supervise the installation.

Use of Gas Is Significant

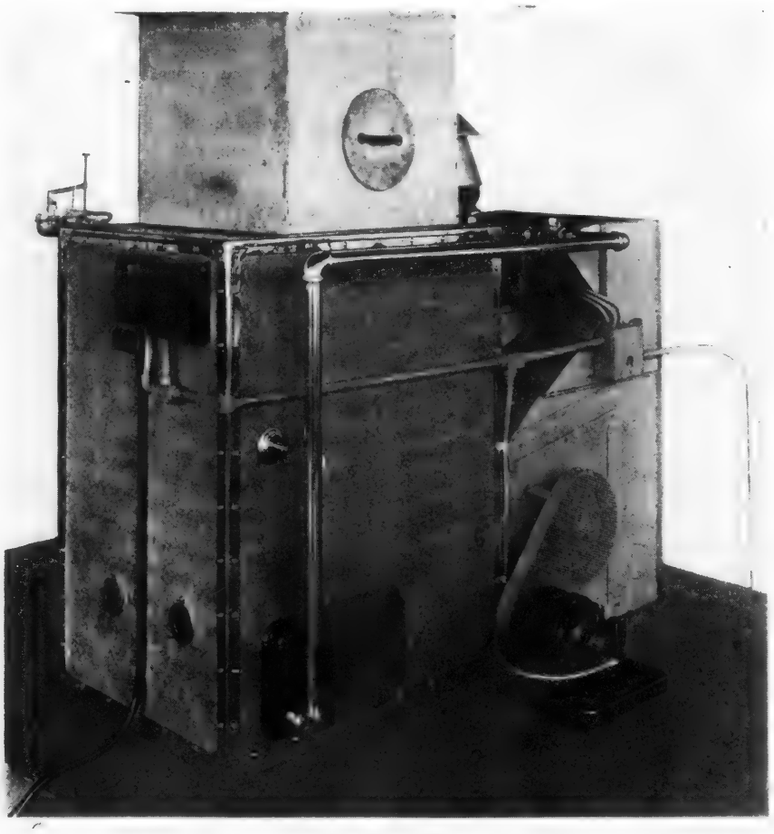
Introduction of the new unit is significant in that it involves the use of gas as the fuel, warm air is used as the heating medium, it is equipped with a blower, it properly humidifies the air, and the air is filtered. High efficiencies possible with gas, the elimination of fuel delivery and storage, its common use in cooking in homes, all led to the selection of gas as the fuel to be used in the Weathermaker. Distribution of the air to the rooms by a blower eliminates the use of the large leader pipes necessary in a gravity system, and allows warm air to be used in places where it would be impossible to use a gravity system, due to the long leaders, too low a cellar, or unusual angles. The new unit furthermore marks the latest step in what has been, especially during the last five years, exceptional progress in the warm-air furnace industry. The processes of cleaning the air by filters, and also humidifying it, are not unusual in large mechanical ventilation installations, but except in comparatively few instances where the equipment was especially adapted for each installaiton, neither process has been used in house-heating practice to any great extent.

Gas Supply Throttled

Throttling control of the gas supply to the burners is a feature of the Weathermaker which enables the unit to follow the demand for heat more uniformly than would otherwise be possible. The new unit is available in three



Diagrammatic View of the Weathermaker, the Heavy Arrows Showing the Path of the Products of Combustion, and the Light Arrows, the Air Flow



Exterior of the New Carrier Unit

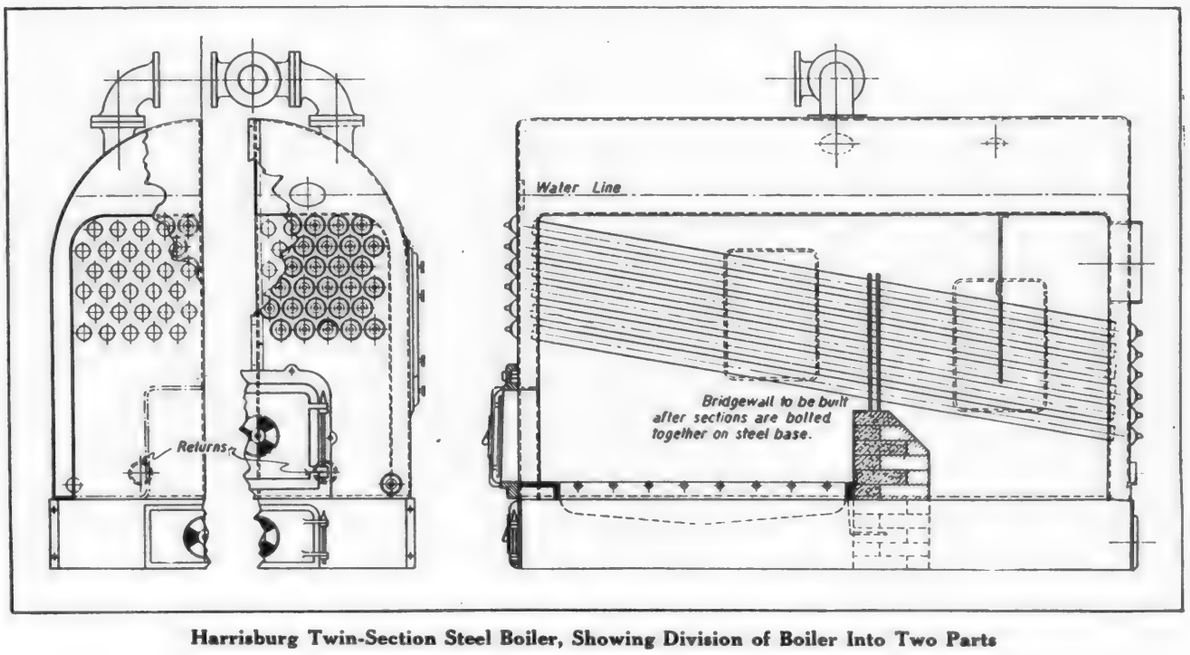
sizes for small, medium-size, and large dwellings.

Harrisburg Star Water-Tube Boilers

The Harrisburg Star Boiler Corp., Harrisburg, Pa., has announced a line of portable steel water-tube boilers for heating and power purposes. Each boiler consists of a shell within a shell, the space between the two forming a water leg which entirely surrounds the furnaces and gas passages. The front and rear water legs are connected by the water tubes which are expanded in the heads, and which slope upward from the back. After passing over the fire, the secondary air is mixed thoroughly with the gases by traveling over a bridgewall in the rear of the firebox and into the combustion chamber. A steel wall extends down into this chamber from the crown-sheet, making it necessary for the gases to pass down under it—insuring complete mixing—and from there up to and out of the breeching. Low-pressure direct-draft boilers can be supplied in 23 sizes with ratings ranging from 2750 sq. ft. to 42,000 sq. ft. of steam radiation. In order to overcome the disadvantage of unwieldy sizes, the company also makes a twin-section boiler, an electrically-welded steel boiler in two pieces, the division being along a longitudinal plane through the center. The two sections are set on the steel base at the job and bolted together. These boilers were designed especially for replacement installations, or wherever the entrance restrictions prevented the use of a one-piece boiler on account of its width. Twin-section boilers are available in capacities from 3100 to 43,500 sq. ft. of steam radiation.

Capitol Red Cap—Round Jacketed Boiler

Square jacketed boilers, in both round and sectional types, have been announced by many manufacturers. The Capitol Red Cap, a round boiler with a round jacket, recently has been introduced by the United States Radiator Corp., Detroit, Mich. Built along the same lines as the Capitol round boiler, the new unit is cloaked in a cobalt-blue casing capped by a cardinal-red top, the finish being in baked enamel. The base also is jacket-covered with rust-resistant iron having two coats of enamel. Under-



Harrisburg Twin-Section Steel Boiler, Showing Division of Boiler Into Two Parts

Capitol Red Cap—Round Jacketed Boiler

neath the jacket is a one-piece blanket of rock-wool insulation between wire meshing. It is installed by placing it around the boiler and fastening with wire. Trimmings are in nickel-plate and black enamel. This boiler can be supplied in an oil-burning type, as well as for coal, with capacities from 200 to 925 sq. ft. of steam radiation.

Low Heat-Transmission Coefficient for Torfoleum

An insulating material, made from dried peat moss, has been in use in Germany for many years and recently has been placed on the American market. This material, Torfoleum, imported and sold by Pennrich and Co., Inc., 29 Broadway, New York, has a thermal conductivity of 0.27 B.T.U. per square foot per hour per 1° temperature difference per 1 in. of thickness. It is of a dense, finely porous texture, with pores about 0.004 in. in diameter, and is impregnated against water absorption, so that it can be used with wet mortar, in connection with concrete, or laid as roof insulation in wet weather. This material also can be used as an absorbent of vibration in foundations for fans, blowers and other machinery, its compression being only 3% under a load of 1760 lbs. per square foot.

The widespread use of Torfoleum in Europe is indicated by the fact that the German National Railway System and the National Railroads of Holland specify this insulating material for their refrigerator cars. A typical example showing the low heat-transmission coefficient of Torfoleum is that of a wall constructed of siding, sheathing, studding, lath and plaster, with a coefficient of 0.221 without Torfoleum, and a coefficient of 0.121 B.T.U. per sq. ft. per hr. per 1 degree difference in temperature using Torfoleum. This material is made in sheets 19½ in. wide, 39 in. long, and from 1 in. to 6 in. in thicknesses.

Insulation of Walls and Roof of Berlin Subway, in this Case Torfoleum Was Used for Sound Deadening

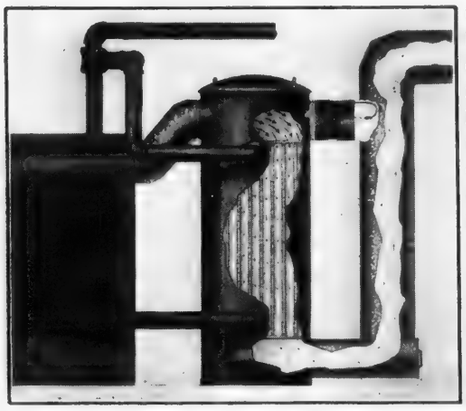
Interior Insulation with Torfoleum Used Under Wire Lathe, the Insulation Being Placed on Furring Strips

Even-Heat Device for Wall Radiators

Fittings to allow the introduction of a pipe running through the entire length of a series of wall radiators in order that, through properly-sized holes in the pipe, steam can be admitted evenly to all parts of the radiation, are announced by the Universal Valve & Fitting Co., East 38th St., Cleveland, O. For every 5 sq. ft. of radiation the fitter drills a ⅛ in. hole in the Even-Heat pipe, evenly spaced between the radiator nipple connections. The free end of the pipe is closed by welding or other means, and on the valve end the special fitting is attached and packed with "Palmetto" packing. Specially intended for enclosures with long lines of wall radiators, this device is designed to make the whole area of the radiation effective.

Leader Fire-Tube Economizer

A fire-tube economizer, designed to be used with existing heating plants, is being marketed by the Leader Iron Works, Decatur, Ill. Flue gases from the boiler pass to the top of the economizer and then down through the inside of a battery of tubes surrounded by water. Cold water flows from the bottom of the boiler to the economizer, from which, after being heated, it rises and passes into the flow mains, or, in the case of a steam boiler, steam is generated in the economizer and passes into the mains. Especially designed for use in connection with oil burners, the economizer is equipped with a stack-temperature-control damper which automatically throws the economizer out of the

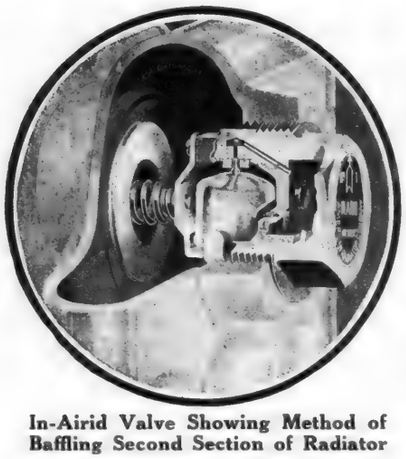


Leader Fire-Tube Economizer

circuit, when the chimney is cold, and throws it back in as soon as the flue-gas temperature rises to 220°. The damper is placed in the short length of smoke-pipe between the top of the economizer and the chimney, so that when the damper is open the gases travel directly from the boiler out to the chimney; when the damper is closed, the gases are forced to pass down the tubes and out to the bottom chimney connection. Four sizes of the fire-tube type are available, as well as the original water-tube economizer, any of which can be used with hot water, steam or vapor systems. A warm-air economizer, built along the same general lines, is designed for warm-air furnaces. Used in connection with steam or water systems, the economizer makes a combination system out of the existing plant.

Short-Circuiting of Steam Prevented by In-Airid Valve

A baffle in the nipple of the last column in a radiator is provided by a valve recently brought out by the American Radiator Co., 40 West 40th St., New York. The purpose of this device is to prevent steam from making a short circuit through the top nipples of the radiator and closing the air valve before all of the air has been eliminated from the bottom of the radiator. It consists of a disc held tightly by a spring against the nipple opening in the top of the next to last column, and a thermostatic float in the outside nipple opening. Steam, in order to reach the valve, must travel down the next to last column and up the last column, pushing the air up to the thermostatic part of the In-Airid valve, which is similar to the No. 500 Airid valve. In-Airid fits all new-type radiators made by leading manufacturers, the threaded plug being 1½ in. I.P.S., and made of brass. It is so designed that all working parts of the valve are inside the radiator, and the hexagonal part of the cap which remains on the outside cannot be turned without a wrench, so that the valve cannot be inverted or stolen, under ordinary circumstances.



In-Airid Valve Showing Method of Baffling Second Section of Radiator

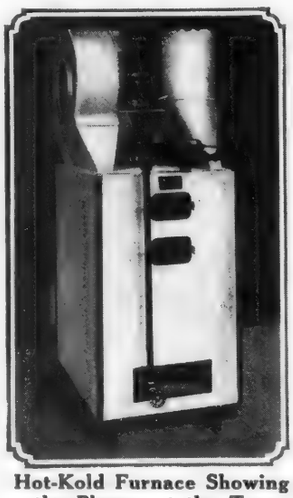
Sheer Heat Motor, One of the Line of Temperature Control Devices

Sheer Temperature Control

Temperature control devices for furnaces and boilers are announced by the H. M. Sheer Co., Quincy, Ill. The thermostat unit is capable of handling fifteen times as much current as normally is required; it is so designed that the contact and break are made with a snap action, reducing arcing and pitting to a minimum. In the heat motor, the device that operates the dampers is a bellows with a bulb projecting from the side. In normal position, the bulb and bellows are filled with a volatile liquid. Along the bulb is a resistance winding, which, when the room thermostat closes the circuit, becomes heated by the current flowing through it, so that the liquid in the bulb becomes vaporized. The pressure due to this vapor expands the bellows and throws the lever arm to which the damper connections are attached. The expansion of the bellows draws the liquid below the level of the resistance winding, so that if there is no fuel in the furnace, or if the fire has gone out, the liquid is not further heated after the draft is opened, even though the current is still flowing through the resistance wire. Consequently, there is no damage done to the bellows. When proper temperature in the room is reached, the thermostat cuts off the current; bulb, bellows and liquids are cooled, the bellows contracts and the lever arm is brought back to the closed damper position.

Hot-Kold Gas-Fired Furnace

A fan-equipped gas-fired warm-air furnace is being marketed by The General Iron Works Co., Cincinnati, O., under the name Hot-Kold. By using a blower to drive the air into the rooms, smaller registers and smaller leader pipes can be used than are possible with a gravity system; 3½ in. pipes are recommended by the manufacturers. In the summer the blower can be operated to keep up a circulation of air through the house. A safety valve is used in connection with the blower, so that if the blower, for any reason, should stop, the gas-supply valve will be closed, thus preventing burned castings. A glass-covered limestone filter is used to moisten the air. The furnace itself consists of an arrangement of passages whereby the cold air enters the top of the furnace and is driven by the fan back and forth through successive horizontal flues surrounded by the hot products of combustion, the air moving downward while the gases pass upward until the air finally passes around and under the combustion chamber, then up the side of the furnace to the leader pipes. The furnace is covered with an acid-proof insulated jacket.



Hot-Kold Furnace Showing the Blower at the Top

SENIOR · HIGH · SCHOOL · · PAWTUCKET · R.I.

MONAHAN & MEIKLE, *Architects and Engineers*, Pawtucket, R. I. ⇝ H. L. GRAHAM & SONS, INC., *Heating Contractors*, Pawtucket, R. I.

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POWERS

New Trade Publications

Constant Warmth Brings Greater Comfort is the message appearing on the cover of an attractively illustrated booklet describing the line of Economy jacketed sectional boilers manufactured by the International Heater Co., Utica, N. Y. Designed for the home-owner, the book takes up the relation between comfort in the home and the proper sized boiler, leading up to the company's guaranteed ratings. A beautiful colored full-page reproduction of one of the boilers is followed by a description of the main features, which include a green asbestos-lined jacket and a brass domestic water heater 40 to 60 gal. capacity. These boilers are available in capacities ranging from 190 to 870 sq. ft. of steam radiation, and from 325 to 1430 sq. ft. of water radiation.

For Every Boiler, Stoker or Hand-Fired, appears on the cover of a brochure on Wing turbine blowers, manufactured by the L. J. Wing Mfg. Co., 154 West 14th St., New York. Advantages of mechanical draft are enumerated, among them being that lower grade, and consequently cheaper, fuel can be burned, smaller chimneys can be used, and the boiler can be forced to greater output. These blowers are designed to be used on individual boilers where no central fan system has been installed, or provision made for such a system, and mechanical draft is desired; they are turbine driven, the turbine being so constructed that they can be operated against back pressure, permitting the exhaust steam to be recovered.

Columbia Jacketed Boiler is the title of a circular received from the Columbia Radiator Co., McKeesport, Pa. This company has introduced to the trade a line of boilers with an attractive black and gray steel, asbestos-lined jacket. Available in both steam and water patterns, these boilers can be supplied in capacities from 400 to 1275 sq. ft. of steam radiation and from 675 to 2150 sq. ft. of water radiation.

A Technical Manual for Architects and Engineers is a well-arranged handbook for those interested in automatic water heaters. The equipment described is that of the EverHot Heater Co., 5189-5241 Wesson Ave., Detroit, Mich. Construction details of the heaters are shown in numerous drawings and photographs, special attention being paid to the differences between various models of the company's products. Complete information is given as to how to figure required capacity for different sized buildings and varying temperature rise, and tabulating the gas consumption under these conditions. Piping details are included, together with laying-out dimensions for the architect or engineer, or for the fitter when roughing in. Size 8½ in. x 11 in. Pp. 32.

Thermodynamics Applied to Paper Drying appears on the cover of a book dealing with paper drying systems made by the Farnsworth Co., Conshohocken, Pa. The effects of changes in heat transfer, steam pressure, and superheat on paper drying are discussed in a general way. Descriptive matter pertaining to the company's paper-drying systems then is presented, followed by an analysis of several poorly designed installations explaining how they could be corrected. Size 8½ in. x 11 in. Pp. 23.

Engineering Data—Robras 20-20 Radiators is a 12-page booklet issued by the Rome Brass Radiator Corp., 1 East 42nd St., New York. The whole book is given over to capacity tables of different types and sizes of these radiators and to drawings showing dimensions for the architect and fitter. Specifications to guide the architect also are presented. Accompanying the booklet, a folder gives list prices to the trade.

Broomell Direct Boiler Return Trap for Vapor-Pressure appears on the cover of Bulletin No. B-139, published by the Vapor Heating Co., York, Pa. With this device, when the water in the return pipe backs up to produce sufficient head, the float in the return trap rises, at the same time lifting a valve mechanism which closes the air port and opens the steam connection to the boiler. Steam pressure in the return line and the boiler being equalized, the condensate flows into the boiler. The float then lowers, the air port is opened and the steam connection closed, the use of a weighted ball making any spring unnecessary. Typical boiler connections are included showing the method of piping when using either a dry or wet return.

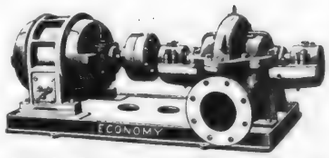
Controlled Ozone, Bulletin No. 50 of the United States Ozone Co., Chicago, Ill., contains a discussion of the phenomenon of ozone production, with a graphical presentation to make clear the text. An explanation of the atomic structure of various elements leads up to a description of the formation of ozone. The basic requirements of ozonizer design, dealing with the character of discharge, dust and water vapor, air flow and energy density are all taken up in a way easily understood, followed by an outline of the uses of ozone in ventilation, oxidations, drying, deodorizing, and cold storage. Detailed specifications for ozone generators and auxiliary equipment are given for the guidance of architects and engineers. The method of presentation of the general data refering to ozone makes this bulletin distinctly worth while for the files of ventilating engineers and students. Size 8½ in. x 11 in. Pp. 35.

6 Ways to Make the Cellar More Attractive, by the Thatcher Co., Newark, N. J., contains six colored illustrations which show pleasing methods of decorating and arranging the cellar. Each of the plates, which include a billiard room, play-room, gymnasium, work-shop, man's den, and dance floor, show the scarlet-cased Thatcher Elite boiler in the background. The booklet will no doubt be valuable in selling the home-owner on the idea of making a more livable room out of the cellar.

Automatic Arc-Welding by the Electronic Tornado Process, published by the Lincoln Electric Co., Cleveland, O., compares metallic arc-welding with carbon arc-welding, and shows photographs of test pieces welded by both methods, together with micro-photographs of the metal at different parts of each type of weld. Tables also are presented showing speeds and cost of the electronic tornado method, which is a special type of carbon arc-welding developed by this company.

Mineral Felt Insulation, a folder issued by the Mineral Felt Insulating Co., Vane and Eleventh Sts., Toledo, O., describes an insulation made of fused rock which is felted into blocks suitable for application to furnaces, heating boilers and domestic water tanks. Being of a pliable nature, these blocks may be fitted easily to curved surfaces, and the manufacturers claim that they will absorb no moisture, the blocks possessing no capillary attraction. The complete jacket, together with the necessary bands, muslin and paste, are supplied in a kit, no wires being required. An automatic gas valve and burner for hot-water tanks is also featured.

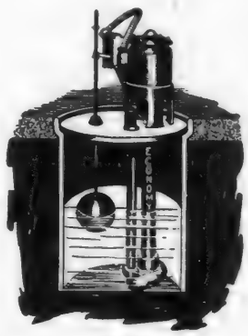
Excelso Indirect Water Heaters, issued by the Excelso Products Corp., Buffalo, N. Y., gives an excellent outline of the operation, uses, and methods of installation, prefaced by a well-written series of questions and answers on the front inside cover. In addition to showing drawings of the Excelso heater and photographs of typical installations, thirteen diagrams are presented of connections and piping used to attach Excelso heaters to boilers of all kinds and also in conjunction with gas water heaters, garage radiators, etc. The demands on various types of hot water fixtures for different buildings are given in tabular form.



Single Stage Centrifugal Pump

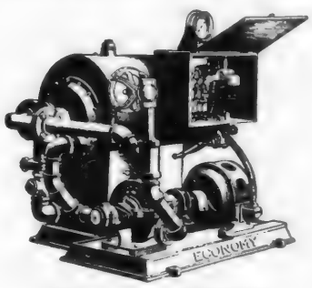
For House Service, Hot Water or Brine Circulation, Air Washer Service, etc.

Recently redesigned to embody the newest hydraulic developments—assuring high efficiency over a broad range. See Bulletin No. 408.



Automatic Sump Pump

Made in all capacities from 10 to 5000 G. P. M. against heads up to 100 feet at speeds from 570-1750 R.P.M. All sizes have renewable bronze bearings, ground shaft, ball bearings and built-in motors of special vertical design. Complete specifications in Bulletin No. 407.



Return Line Vacuum Heating Pump

A highly developed apparatus for the rapid removal of air and water from heating systems and the discharge of the water to the boiler. Bronze fitted pumps, air eliminator, vacuum receiver, and automatic control are standard equipment. See Bulletin No. 409.

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The Gospel of Fresh Air, a ventilation handbook issued by the Swartwout Co., Cleveland, O., first takes up the need for ventilation, then discusses roof ventilators and their development, and finally the construction and typical installations of the Swartwout ventilator. Blueprints and photographs of Swartwout installations include those in mills, public buildings, shops, and garages. A special page takes up the ventilation of the monitor-type building, while the last few pages are devoted to engineering data, instructions for specifications, and dimensions for roughing-in, for the use of architects and industrial engineers. Size 8½ in. x 11 in. Pp. 40.

B & G Indirect Water Heaters is the caption appearing on a letter-size manila folder designed for handy reference, showing sizes and capacities of the various indirect water-heaters manufactured by Bell & Gossett Co., 3000 Wallace St., Chicago. Capacities of the different units are given, not only in gallons, but also in the size and type of buildings to which each is adapted, together with the size storage tank needed. A table gives the size heater to be used for pre-heating fuel oil, listed under different gravities for various amounts. Typical installation diagrams are presented, so that all of the material dealing with these heaters needed by the architect or heating contractor is to be found in the quickest possible way by the use of this folder.

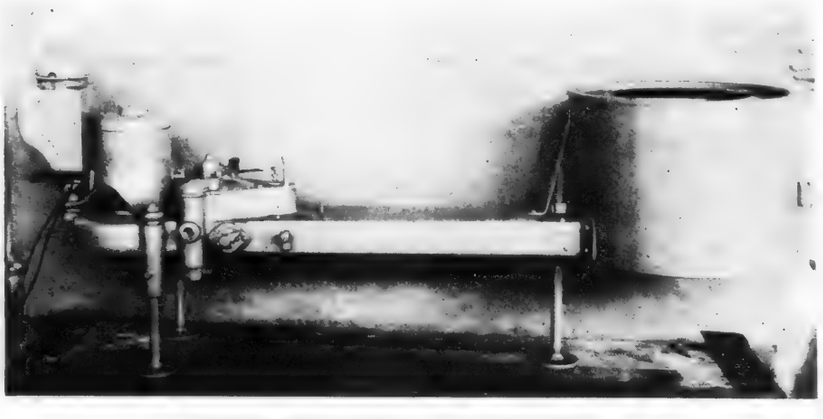
Vapor-Vacuum Pressure Heating Specialties appears as the title of a catalog received from O-E Specialty Mfg. Co., Milwaukee, Wis. The "3-in-One" system is explained and each of the fittings used described and illustrated, a diagram of the whole system being shown in detail. O-E flow control for hot-water systems and the Burdick fuel saver are described, followed by copies of many testimonial letters relating to O-E systems.

Announcing Oil Heat for Small Homes, a folder published by the Williams Oil-O-Matic Heating Corp., Bloomington, Ill., is designed to tell the story of the Dist-O-Matic oil burner. A time payment plan of $50 down and the balance monthly, is outlined to appeal to the owners of cottages, bungalows and small homes. This burner is made in two sizes, the smaller being for houses of five rooms or less, the other for homes of six and seven rooms.

Direct Current Motors manufactured by The Louis Allis Co., Milwaukee, Wis., are described and illustrated in Bulletin 507. Special features of construction are pointed out in a two-page spread showing the important mechanical details. Among the applications of L-A direct-current adjustable-speed motors are stokers, the speed range being obtained by shunt-field variation. Special types of direct-current motors include the vertical types, hoist and crane motors, and standard and special blower motors. Photographs of two well-known blowers with direct-connected motors are included in the photographs of typical applications.

Adsco Expansion Joints, a product of the American District Steam Co., North Tonawanda, N. Y., are described in a recent folder. Photographs of the numerous types of joints for different pressures and service conditions are shown. Five skyscrapers are illustrated as examples of tall buildings using Adsco riser expansion-joints.

The Supreme Achievement in Unit Heaters is the message contained in a folder issued by The New York Blower Co., 32nd St. and Shields Ave., Chicago. Construction details of the Comet unit heater are described, including an extra heavy fan, a heavy-duty motor, and strong, round tubes. Among the advantages claimed for the unit is that it is not too heavy for overhead use, and yet has been made sturdy enough to withstand the stresses of excessive steam pressure, air pounding, and freezing. The floor-mounted models also are of heavy construction, and are available with either the company's welded steel core or with Arcoblast. Overhead models and floor type can each be supplied in three sizes.



Dist-O-Matic Oil Burner for Small Houses

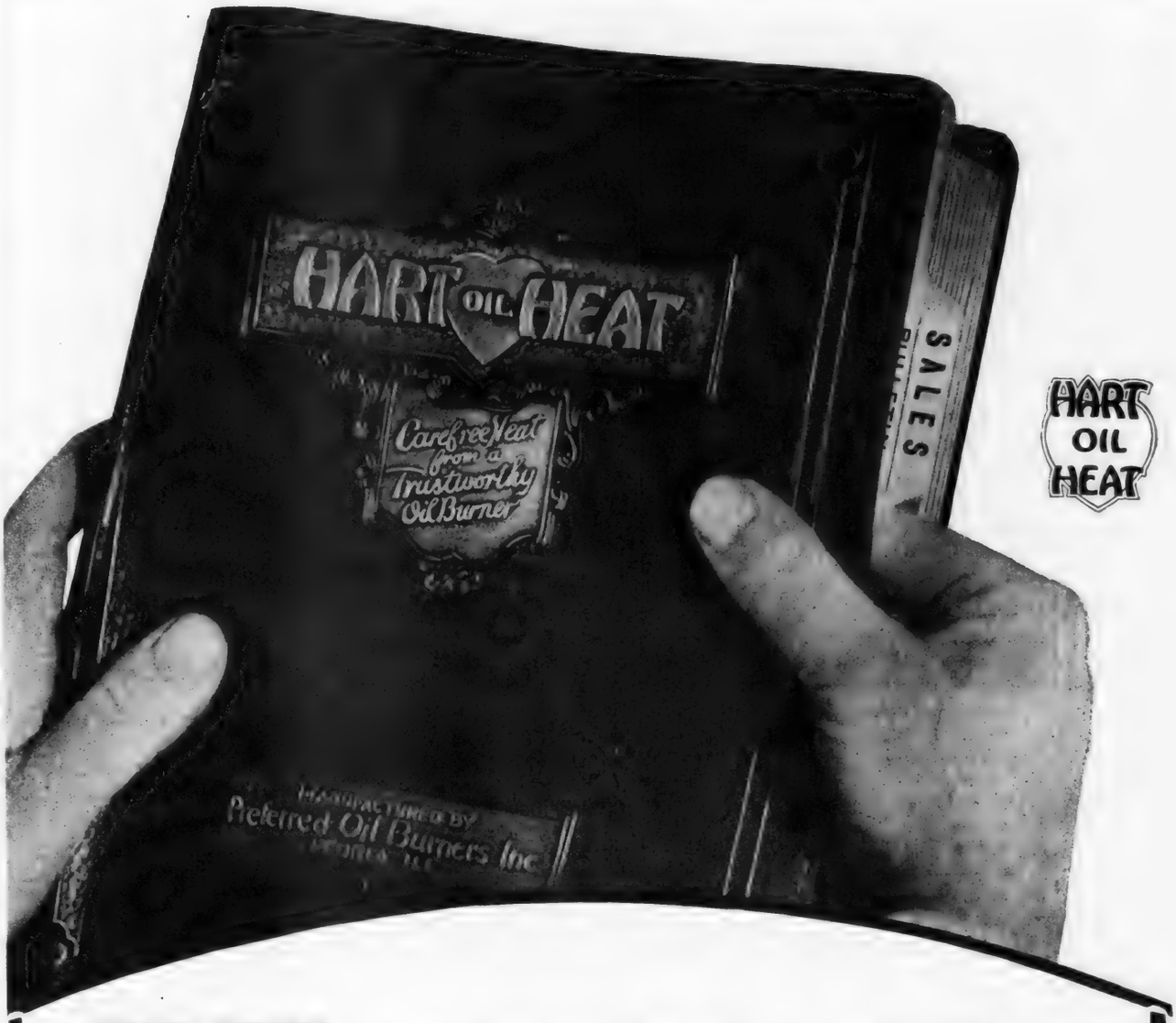
Marsh Products is the title of Bulletin No. 34 which describes and illustrates radiator traps, valves, air valves, and indicating and recording industrial equipment manufactured by Jas. P. Marsh & Co., 2073 Southport Ave., Chicago, Ill. Blueprints are included showing typical layouts using the No. 1 and No. 2 Reflux thermostatic trap, the Hi-Lo differential governor as installed on a vacuum job, the No. 5 dual-valve float trap, the low-pressure blast trap, and the Hvyflo float drip-trap. Boiler piping details and radiator connections for vapor and vacuum systems are presented in a clear and attractive way, followed by a cut-away view of the packless valve. This bulletin is not only of value as a catalog, but because of its presentation of layouts should have a place in the files of all engineers and architects who plan vapor and vacuum systems. Size 8½ in. x 11 in. Pp. 32.

Aero Sizes and Ratings are listed in a booklet issued by the National Radiator Corp., Johnstown, Pa. Capacities and dimensions of the full line of three, four, five, six and seven-tube Aero radiators are given, as well as complete information about wall radiators and radiator brackets and hangers manufactured by this company.

New National Jacketed Boiler is the subject of another folder received from the National Radiator Corporation. The jacket, finished in an empire-green enamel, covers a thick layer of rock-wool insulation, while the trimmings are black. Of the sectional type, the boiler has a deep firebox and the gases travel two full flue lengths after leaving the combustion chamber. The boiler is designed to burn hard or soft coal or coke. Ratings range from 400 sq. ft. to 1275 sq. ft. of steam radiation.

Page Red Diamond Jacketed Boilers are featured in a folder sent out by The Wm. H. Page Boiler Co., 200 Madison Ave., New York. The Page round boiler is used so that a deep fire can be carried, the jacket being square with a scarlet finish and black trimmings. An air space between the boiler and the jacket supplies insulation in connection with a lining on the jacket consisting of 1¼ in. of air-cell asbestos. The boiler is shipped assembled, the jacket being attached by means of lock-lap joints. Ratings on these boilers are from 400 sq. ft. to 1450 sq. ft. of steam radiation.

Horton Variable-Speed Pulleys for Ventilating Fans is the caption appearing on three sheets received from the Horton Mfg. Co., Minneapolis, Minn. An infinite number of speed changes are given by this device, which is made in many models, counter-shaft and drive-shaft, a speed reduction of 65% in fan service being guaranteed. Control is furnished by a simple movement of a handle.



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"The Business of Selling Hart Oil Heat" is just off the press. A brand new sales manual with proved ways for closing orders. If you are thinking about joining the oil burning industry you should read this book. Write for yours before the limited supply is exhausted.

This fast growing organization needs more men. Our distributors want sales managers. Our dealers want salesmen. This factory needs resale men to help dealers close hot prospects. Good installation men, too, are in big demand.

Men joining this organization will find this new book "The Business of Selling Hart Oil Heat" a sure guide to their first efforts toward success. And, after they join, there is available the industry's most complete and helpful sales kit (shown above). It includes bulletins that keep men posted on factory operation. Others that give new angles for installation work and how to eliminate service calls. Includes, too, complete sales and advertising helps.

If you are interested in a Preferred-Hart dealership—or, if you want to enter a field where the financial rewards and training will start you on the road to a business of your own—write for "The Business of Selling Hart Oil Heat."

Preferred Oil Burners, Inc.

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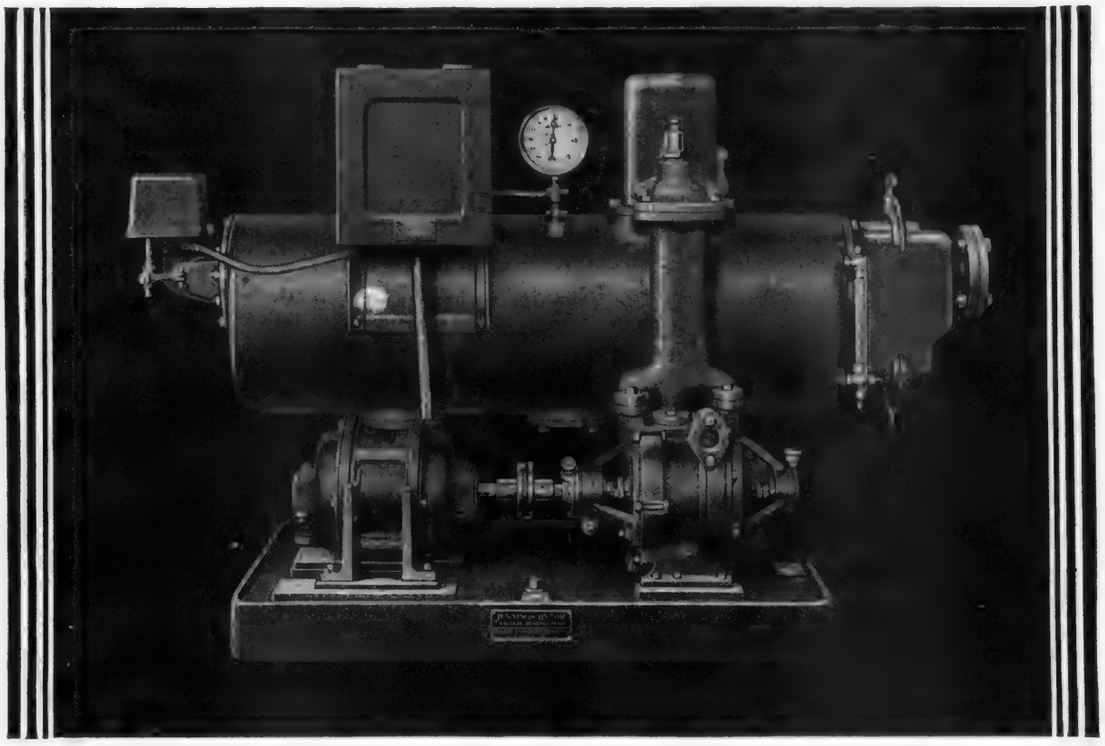


Jennings Vacuum Heating Pump, for return line heating systems having up to 300,000 sq. ft. equivalent direct radiation.

Jennings float control . . .

actuated by water to be removed from system

Consult Bulletin 71 for details of design, operation, and installation.

AS the condensation from the return line heating system accumulates in the receiving tank of a Jennings Vacuum Heating Pump, it causes a seamless copper ball float to rise. At a predetermined level, the ball float mechanism trips a pilot switch which in turn actuates the motor self-starter and starts the pump.

Water is then withdrawn from the tank and returned under pressure to the boiler. Pumping is continued until the water level is brought down to the point at which the float switch opens and stops the pump.

It is to be noted that the primary purpose of Jennings Float Control is to regulate the removal of water from the system—*not* to permit the pump to act as a boiler feeder.

Jennings Pumps

THE NASH ENGINEERING CO 81 WILSON ROAD, SOUTH NORWALK CONN.

Trade and Miscellaneous Notes

Coming Events

October 8-12, 1928. Tenth annual convention of the American Gas Association in Atlantic City, N. J. Headquarters at Young's Million Dollar Pier.

October 8-12, 1928. Fall meeting of the American Welding Society in Philadelphia, Pa. Headquarters at the Bellevue-Stratford Hotel, and exhibit at Exhibition Hall of the Commercial Museum.

October 15-19, 1928. Fifty-seventh annual meeting of the American Public Health Association in Chicago, Ill. Headquarters at the Hotel Stevens.

December 3-8, 1928. Seventh National Exposition of Power and Mechanical Engineering in New York. Headquarters at the Grand Central Palace.

December 4-5, 1928. Mid-year meeting of the National Warm-Air Heating Association in Buffalo, N. Y. Headquarters at the Statler Hotel.

January 28-31, 1929. Annual meeting of the American Society of Heating and Ventilating Engineers in Chicago, Ill. Headquarters at Edgewater Beach Hotel.

April 9-11, 1929. Sixth annual convention of the American Oil Burner Association in New York. Headquarters at the Hotel Pennsylvania.

April 24-26, 1929. Annual meeting of the National Warm-Air Heating Association in Chicago. Headquarters at the Hotel Stevens.

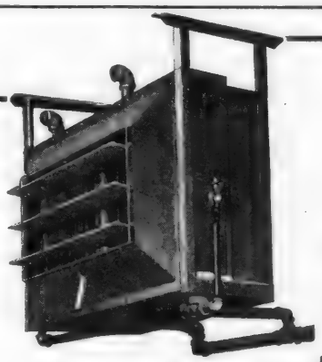
Miscellaneous Notes

August building operations, as reported by the F. W. Dodge Corporation, show a moderate decline. However, construction in the northwest area, amounting to over $10,000,000, showed a 21% increase over July and was the highest August total ever recorded in the district. The decrease from July of this year was 11% and the decline from August of last year was 6%. The figures for the 37 states east of the Rocky Mountains were $516,970,200. Analysis of this record shows that 41% of all construction was for residential buildings, 23% for public works and utilities, 11% for commercial buildings, and 8% for industrial projects.

In New York State and Northern New Jersey contracts amounted to $126,859,400, representing a decrease of 8% from July and 10% from the total for August of last year. The New England States report a contract total of $39,035,200. This shows an increase over last month of 7%, but a decrease of 3% from August, 1927.

Contracts in the Middle Atlantic States amounted to $51,066,700, showing an 18% decrease from the total for July of this year, and 27% from the total for August of last year. Pittsburgh contracts amounted to $57,304,200, representing a decrease of 11% from July of this year and a decrease of 20% from the total for August, 1927.

In the Central West, contracts amounting to $166,291,900 represented the second highest August contract total on record for this district. It was 8% over August, 1927, but there was a decrease of 18% from the total for July of this year. A record August construction was reported in the Northwest, contracts amounting to $10,448,500. This was the highest August contract total ever recorded in this district, representing a



Autovent Unit Heater
Ceiling Type

Special Features

Heavy-duty motor . . . specially designed fan wheel . . . extra large size pressure chamber . . . tapered discharge . . . positively guaranteed performance . . . unusually careful and finished workmanship throughout . . . built for continuous duty.

Economy Begins with
AUTOVENT

Because—

Fewer units are needed for equivalent heat radiation; the job is installed quicker, thus saving on labor time.

Fewer traps or valves needed; another important saving in cost.

Less piping, fewer fittings; labor cost further reduced by shortening time required to complete installation.

Overhead installation further reduces cost where floor-space is at a premium.

No hot, over-night fires necessary.

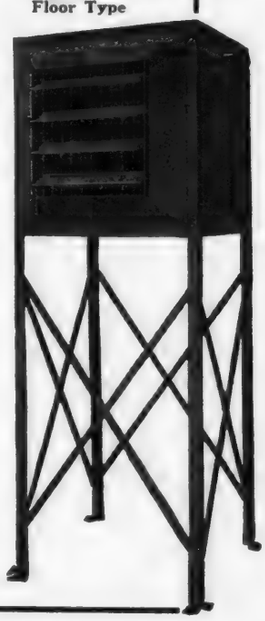
Greater flexibility of control gives more rapid heat spread for same amount of steam used.

Each unit individually controlled and can be shut down when not needed; a vital saving.

Cost of maintenance is less because of fewer units to look after.

AUTOVENT FAN & BLOWER CO.
1805-27 N. Kostner Ave., CHICAGO, ILL.

Autovent
Unit Heater
Floor Type



21% increase over July, and also a 6% increase over the total for August of last year.

The Southeastern States report contracts amounting to $48,753,900, showing an increase of 3% over August of last year, but a decrease of 8% from the total for July of this year. In Texas, figures amounted to $17,210,400, representing a 10% decrease from July of this year, and a 4% decrease from the total for August of last year.

Eastern Supply Association will hold its fall meeting at the Hotel Astor, New York, October 10-11. Reports of officers will feature the gathering.

B. K. Breed, who has been for the past four years divisional engineer for the Underwriters' Laboratories, in Chicago, in charge of domestic and industrial oil-burner testing, has resigned to join the architectural department of the Preferred Utilities Co., 33 West 60th St., New York. Mr. Breed will devote his entire time to aiding architects, engineers and builders in planning and laying out Ray or Hart oil-burning systems.

American Welding Society Fall Meeting to Be Held in Philadelphia

With meetings at the Bellevue-Stratford Hotel, and an exposition at the Commercial Museum, the American Welding Society will hold its fall meeting in Philadelphia, October 8-12. Among the papers to be read at the technical sessions will be one by R. A. Jack, a member of the staff of *Domestic Engineering*, on "Welding in the Heating, Ventilating and Plumbing Industry." Other papers include "Erecting a Building by Welding," by J. F. Lincoln, Lincoln Electric Company; "Formulae for Computing Design Stresses for Pressure Vessels," by S. W. Miller, Union Carbide and Carbon Research Laboratories, and "Welds at Elevated Temperatures," by Prof. C. Moser, Leland Stanford University. The American Bureau of Welding, the research department of the society, will hold a special afternoon meeting on October 12.

Industrial Gas Course at Illinois Well Attended

Thirty-three gas companies sent 51 men to the recent industrial gas-engineering course, held at the University of Illinois, by the Illinois Gas Association. Among the interesting papers and lectures were "House-Heating Estimating," by Glen C. Carnahan; "Water vs. Steam Heating," by Prof. W. H. Stevens; "Warm-Air Heating," by G. B. Shawn; "House Heating," by H. B. Johns; "Selling House Heating," by L. C. Harvey; "What the Industrial Gas Engineer Needs to Know about Combustion," by Dr. T. E. Layng. The subject of temperature control was covered by Prof. A. I. Andrews, and a discussion on insulation was conducted by Messrs. Carnahan, Johns, and Layng.

C. A. Dunham Establishes Foreign Marketing Company

Increased sales in the London, England, office of the C. A. Dunham Co., Ltd., of Toronto, Canada, have resulted in a change in the methods of marketing by this company. The Canadian plant was built to supply Canada and Great Britain with the specialties originally sold by the C. A. Dunham Co., Chicago, but the London branch, under the direction of A. J. Assheton, created such a large outlet for the products of the Toronto organization that it was felt the United Kingdom could best be served by an entirely separate British company. Consequently, C. A. Dunham Co., Ltd., of the United Kingdom, has been organized and has taken over all the assets and business of the C. A. Dunham Co., Ltd., of Canada, in the United Kingdom. All business in the United Kingdom and certain countries of Europe will be handled by the British organization under the direction of A. J. Assheton.

Bryant Increases Laboratory Facilities

The research laboratory of the Bryant Heater and Mfg. Co., Cleveland, has been moved into new quarters on East Sixty-second street in that city. Major W. E. Stark, research engineer, and his staff will have at their disposal complete facilities for the testing of gas-heating equipment with both natural and manufactured gas. The test floor is equipped with gas, water, steam and flue-piping, so arranged that tests on four boilers can be run simultaneously.

Determination of carbon monoxide in the flue-gases will be made by the use of an iodine-pentoxide apparatus; recording temperature instruments will be used, and feed water will be forced into the boilers by compressed air. Morehead apparatus for fuel and flue-gas analysis also will be available, as well as sensitive draft and pressure gauges. The laboratory represents an investment of $20,000, and will be devoted to obtaining solutions to problems of design of house-heating equipment, investigation of gas flow in appliances, testing of boilers, and obtaining such data as will enable gas companies to develop the gas house-heating market and aid the Bryant company in designing and building equipment that will give the consumer the best possible service.

Deaths

Allen M. Schoen, president National Fire Protection Association, died August 15. Mr. Schoen was elected to the presidency of the association at the annual meeting last May, previously having served as first and second vice-president, and as a member of the executive committee. He also was chairman of the committees on electric power houses, electric railway car houses and cars, and protection against lightning. Mr. Schoen was chief engineer of the Southeastern Underwriters Association, at Atlanta, Ga., which position he held for many years. During the World War he played an active part in the work of the federal railroad administration.

Charles J. Peck, president of the Detroit Engineering Society, died September 9, at his home in Highland Park, Mich.

Charles F. Flett, well-known heating contractor in New England, died at the Melrose Hospital, Melrose, Mass., August 15, at the age of 65. When a boy, Mr. Flett went to Boston and forty years ago he founded the firm of English & Flett, heating contractors, this later becoming the Walworth-English Flett Company. In 1924, Mr. Flett retired from this company and became New England representative for the Hart & Crouse Co., Utica, N. Y.

M. D. Hussie, one of the founders and a former president of the National Retail Hardware Association, died at the age of 60 at Omaha, Neb., August 10. Mr. Hussie was well known in the sheet metal and furnace business, and was secretary of the Western Warm-Air Furnace & Supply Association at the time of his death.

J. Byers Holbrook, consulting engineer of 70 East 45th St., New York, died September 26. Mr. Holbrook was a graduate of Cornell University and at the time of his death was 55 years of age.

William Miller Chace, president and treasurer of the W. M. Chace Valve Co., Detroit, Mich., died at his home, August 14, in his 66th year. Mr. Chace first entered the laundry industry in 1892, when he formed the Washington Laundry in Chicago. A few years later he became interested in the gold situation in Alaska and spent 11 years in the far north. He reentered the laundry field in 1914, with a company interested in equipment, and eventually developed the valve which bears his name. Mr. Chace also was inventor of a thermostatic metal used in the heating and ventilating industry.

Old Timer: "Used to 'figger' that steam coils up near the ceiling weren't much good, but with Thermoliers it's different. They blow the heat right where you want it."

The Old Timer Knows

PURE copper louvers, in common with all other parts of the Thermolier, are designed to last indefinitely.

There are four of these louvers and they are adjustable independently so that the stream of air, which the fan forces between the finned copper steam-coils, can be directed to give best results.

If desired, the louvers may be set in such a way that a part of the air stream issues almost horizontally, while the remainder is directed downward at a sharper angle. This facilitates the uniform distribution of heat by very simple means.

Grinnell Thermolier—Industrial Type—50 years heating experience in 4 sq. ft.

It is an easy matter, when the Thermolier is in place, to try the louvers in various positions until the best one is found. Each louver then is locked merely by tightening the acorn nut at each end.

This convenient louver arrangement is only one of 14 points which, as the Old Timer says, "put the Thermolier in a class by itself." Before you buy any unit heater ask us to send you a free booklet describing the Thermolier's 13 other points of superiority.

Thermoliers are made in two sizes and four capacities. The size illustrated is two feet square and is equivalent to 600 or 800 sq. ft. of cast-iron radiation with fan running at 850 or 1150 r.p.m. The new small size, intended for wash or locker-rooms, offices, small storerooms, etc., is one foot square and takes the place of 100 or 200 sq. ft. of radiation depending on fan speed.

GRINNELL
PIPE FITTINGS

GRINNELL COMPANY

Executive Office: Providence, R. I.

Branches in all Principal Cities

14 Points of Superiority

GRINNELL COMPANY, INC.
208 W. Exchange St., Providence, R. I.

I want to read more facts about the Thermolier. Send along the booklet.

Name_____

Address_____

City_____

Manufacturers' Notes

Mears-Kane-Ofeldt, Inc., 1903 East Hagert St., Philadelphia, Pa., has appointed Herbert H. Etter as sales engineer for the Philadelphia district, which comprises eastern Pennsylvania, southern New Jersey, Delaware, Baltimore, and Washington. Mr. Etter was formerly associated with the Philadelphia Gas Works Company and, in his new connection, his headquarters will be in Philadelphia.

Simplex Heat Regulator Co., Minneapolis, Minn., manufacturer of automatic heat-control devices, announces that the active management of the company has been taken over by its president, H. I. Kenney, and George W. Kenney, formerly New York branch manager of the Gurney Heating Company. Distribution heretofore has been confined to the Northwestern States, but under the new management, it will be extended to embrace the United States and Canada.

S. T. Johnson Co., 940 Arlington Ave., Oakland, Calif., has appointed, as distributors for western Oregon, Hastorf, Lord, Inc., of Portland, for Johnson oil burners, oil-pumping and preheating equipment.

Rome Brass Radiator Corp., 1 East 42nd St., New York, has established an office at 545 Leader Bldg., Cleveland, O., in charge of Robert A. Wilson. Announcement recently was made that increase in the company's business has made necessary the extension of the New York offices to include the entire eighth floor at 1 East 42nd Street.

Bryan Steam Corp., Peru, Ind., manufacturer of Bryan oil and gas-burning boilers, has opened an office at Room 439, Penobscot Bldg., Builders and Traders Exchange, Detroit. R. W. Knee is representative.

Chambers & Carley, 2 Bloor Street West, Toronto 5, Ontario, will handle the manufacture and distribution of Zephyr washed-air systems in Canada. This company also is the engineering division for Minneapolis-Honeywell temperature controls in Ontario.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill., has appointed R. O. Ahlenius as general manager to cooperate with heads of all departments of the company.

Prest-O-Lite Co., Inc., 30 East 42nd St., New York, has added two new plants to its chain, making the total thirty-three, to serve industry with dissolved acetylene used in oxy-acetylene welding and cutting. One plant is at 631 South 17th St., Harrisburg, Pa., in charge of H. A. Smith, and the other is at 17th and West Lawrence Sts., Allentown, Pa., in charge of J. W. Summers, superintendent.

Lincoln Electric Co., Cleveland, O., has opened a San Francisco office at 533 Market Street, in charge of W. S. Stewart.

W. B. Connor Co., Inc., New York, with its subsidiary division, the General Air Filters Corporation, has moved from its plant in Brooklyn, N. Y., to its new plant at Lincoln Park, N. J. The main building is of brick construction with a floor space of 20,000 sq. ft., where the company will manufacture air cleaning and conditioning equipment, steam traps, and the new Dubus pump for viscous liquids. The New York office at 369 Lexington Ave., New York, will be continued as a sales office, but executive headquarters will be established at the plant.

Reif-Rexoil, Inc., 52 East North St., Buffalo, N. Y., has appointed the Western Oil Burner Co., Inc., Portland, Ore., as distributor for Rexoil automatic fuel oil burners in the states of Oregon and Washington. J. D. Robb is president of the Western Oil Burner Company.

Smith Plumbing & Heating Supply Co., 754 Albany St., Schenectady, N. Y., has been established by William C. Smith, who formerly was associated with the Aird-Don Co., of Troy, N. Y.

Youngstown Welding Co., Youngstown, O., annnounces that in about thirty days it will market its new line of welded gas-fired boilers. Officers of the company are: President, W. D. McKay; general manager, C. H. Watson, and George H. Patterson, formerly of the Whiteacre Boiler Company, is in the sales department.

Mueller Co., Decatur, Ill., held a sales conference recently which was attended by every Mueller salesman in the country and also the Canadian division. The conference ended with the annual outing of the company's employees at Fairview Park, August 18. In addition to many games played during the day, there was a golf tournament managed by Frank Mueller. An entertainment program also was presented by the Mueller Recreation Club, and dancing completed the day. General committee in charge of the outing was: Robert Mueller, Adolph Mueller, F. W. Cruikshank, W. T. Mason, J. W. Wells, C. F. Roarick, C. G. Auer, and E. H. Langdon.

Reynolds Metals Co., Brooklyn, N. Y., has been organized as an operating company to conduct the business of the United States Foil Co., Louisville, Ky., Robertshaw Thermostat Co., Youngwood, Pa., and the Beech-Nut Foil Co., Canajoharie, N. Y. The Robertshaw company, with no change in name or personnel, becomes a division of the Reynolds company and will continue its own business. The Reynolds company may take control of the Fulton Co., of Knoxville, Tenn., as directors of the latter have recommended that the offer be accepted by the stockholders.

Crane Co., Chicago, Ill., is erecting a two-story-and-basement fireproof building on Front Street, in Grand Island, Neb., a warehouse to be added at a later date. This addition to its wholesale branches was made because the branches at Omaha and Denver were too far distant. E. F. Gray, with the Omaha branch for 25 years, will be manager at Grand Island, assisted by E. J. Jacobus.

Lincoln Radiator Corp., North Tonawanda, N. Y., has renewed its lease on its former plant on Dwyer Ave., at Utica, N. Y. The plant will be used as a warehouse and shipping point, although the foundry will remain idle for a while. C. D. Nelson is in charge at Utica for the handling and shipment of radiators from that city.

Newport Boiler Co., Inc., Chicago, announces that three former members of the sales staff of Eaton-Kent, Inc., distributors of Newport boilers in New Jersey, have joined the company's eastern office staff at 103 Park Ave., New York. Earle H. Fiigon will have headquarters in Elizabeth, N. J., and will travel in southern New Jersey; H. I. Bunton and E. H. Stickles will cover the northern New Jersey territory.

Milwaukee Valve Co., Milwaukee, Wis., has arranged with the Direct Control Valve Co., of Chicago, to manufacture all of the products of the Direct Control Valve Company, including those of the Lawler Regulator Co., of Mt. Vernon, N. Y., which was purchased by the Direct Control company. Manufacturing will be discontinued at the Lawler plant and this will be used as an eastern warehouse and laboratory by the Direct Control company.

Van Dorn Electric Tool Co., Cleveland, O., has transferred E. J. Phillips from the Detroit territory to San Francisco. George Phillips will succeed his brother in Detroit. J. F. Spaulding will succeed Jack Beggs in the Baltimore territory and Mr. Beggs will be at the headquarters office in Cleveland.

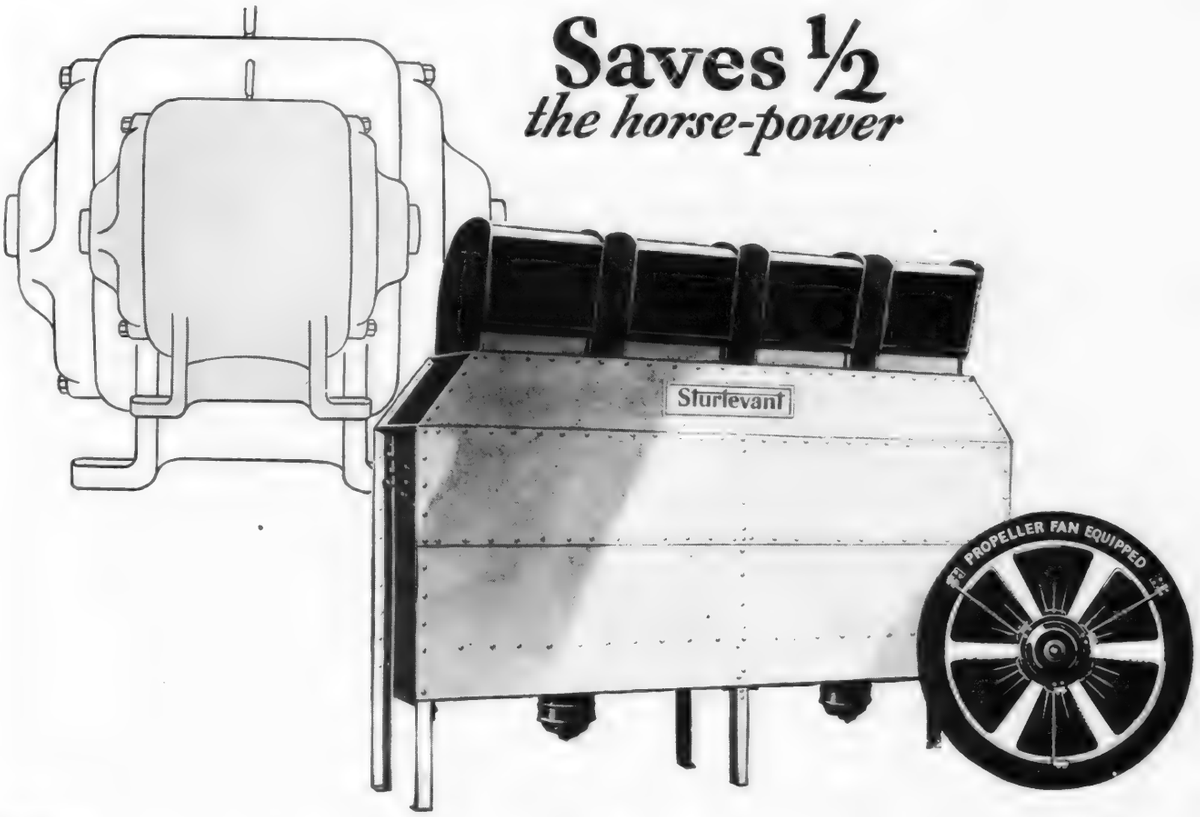
Ames Iron Works Division of Pierce, Butler & Pierce Mfg. Corp., Oswego, N. Y., has appointed Joseph A. Bohn as general manager, succeeding the late Joseph Gaskill. Mr. Bohn formerly was plant manager of the Ames Iron Works.

Changes of Address

Ric-wiL Co., Cleveland, O., has moved its New York City office to 101 Park Avenue. C. W. Lemmerman is manager and will demonstrate Ric-wiL products in the new display room.

Spray Engineering Co., 60 High St., Boston, Mass., has moved its office from this address to the factory at 114 Central St., Somerville, Mass.

Saves ½ *the horse-power*



These engineers "knew their fans"!

Result:—a 50% saving in electric power consumption

"WHAT type of fan shall we use?" This was one of the questions that arose when Sturtevant Engineers were designing "Tempervane" Heating Units.

Housed Centrifugal—or Propeller Type Fans? A choice had to be made.

Similar, and apparently successful, equipment on the market was centrifugal-fan equipped. But in the face of years of Sturtevant engineering experience—the use of propeller type fans seemed to be plain common sense.

Tests were made in the Sturtevant Research Laboratories — undoubtedly the most thorough and accurate unit heater tests ever conducted. Both types of fans were subjected to exhausting tests under actual unit heater operating conditions. The high standards established by the heating and ventilating societies were used. Unbiased results were inevitable, for Sturtevant makes both types of fans and favors neither one or the other.

Sturtevant Tempervane Heating Unit, Overhead Type

Result:—Sturtevant Tempervane Heating Units are *propeller-fan* equipped. For any air delivery or B. T. U. capacity they require motors only one half the horsepower of those used in similar units equipped with housed centrifugal type fans. Current consumption cut 50%.

Send for all facts regarding this new Sturtevant equipment. Our nearest office will gladly send you a copy of Catalog No. 363.

B. F. STURTEVANT CO., Hyde Park, Boston, Mass.

Branch Offices in Principal Cities

Canadian Offices at: Toronto, Montreal and Galt. *Also Agents in Principal Foreign Countries*

Sturtevant REG. U.S. PAT. OFF. *Tempervane* **Heating Units**

Classified Advertising

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

WANTED—By a large contracting concern in Milwaukee, a first class superintendent, familiar with all branches of heating and ventilation, capable of handling men to best advantage. State age, practical experience and technical, if any, also salary expected. Address Box 101, care of Heating and Ventilating Magazine.

MANUFACTURERS' AGENTS WANTED—An eastern manufacturer of an extensively advertised complete assortment of very high grade brass radiators for enclosed work, will consider applications from established manufacturers' agents located at Indianapolis, Louisville, Atlanta, Birmingham, St. Louis, Kansas City, St. Paul or Minneapolis, Dallas and Salt Lake City. Applicants should have sales engineers' experience in heating work and an acquaintance with architects, consulting engineers and heating contractors. Rare opportunity. Correspondence strictly confidential. Address Box 102, care of Heating and Ventilating Magazine.

WANTED — Salesman or manufacturer's agent for Philadelphia and surrounding territory. We manufacture a line nationally known and are the leaders in our field. Applicant must be in touch with the architects, consulting engineers, plumbing, heating and steam fitting contractors. Give full details of qualifications and experience. All replies will be treated strictly confidential. Address Box 103, care of Heating and Ventilating Magazine.

POSITION WANTED—Engineer experienced in the preparation of plans and specifications of heating and ventilating systems; also general mechanical equipment of buildings. Young man, married, good education. Capable of taking charge of mechanical equipment layouts. Address Box 108, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—**Manufacturer of complete line of fans, air washers and unit heaters, desires recognized representative on commission basis. Address Box 105, care of Heating and Ventilating Magazine.**

SALES ENGINEERS WANTED

One of the oldest, largest and most reputable concerns in the United States, manufacturing heating specialties for vacuum and vapor heating systems, has territory available for competent organization or engineering salesmen who are well established and financially responsible. The products of this company are nationally advertised, the line is complete and offers unlimited possibilities to capable representatives. Some territory will be new, some is territory now covered where a change will be made and includes some of the large metropolitan centers. Consideration will be given only to those fully meeting qualifications, and all replies will be treated strictly confidential. Address Box 106, care of Heating and Ventilating Magazine.

ENGINEER WANTED — Mechanical engineer, graduate, with or without experience, to assist in our research and engineering division, developing and testing heating and ventilating equipment. Please give full information as to your education, experience, if any, age and references. This position offers opportunities for advancement in a rapidly growing organization. THE HERMAN NELSON CORPORATION, Moline, Illinois.

VAPOR SPECIALTY REPRESENTATIVES WANTED—Some territories open at present, particularly in the west and south. Good proposition for established men who have following with plumbing and heating contractors and architects. State territory and other lines handled. Layouts not necessary. We are an old established company. Our heating system is simple and popular. Communications held strictly confidential. Address Box 107, care of Heating and Ventilating Magazine.

FOR SALE—2 second-hand No. 10 Niagara Conoidal Fans. 1 No. 14 Niagara Conoidal Fan. Both type "N". Good condition. Address Box 109, care of Heating and Ventilating Magazine.

FOUND!
Hidden Profits Uncovered

By simple investigation of trade details which is often called technical training. Let us help you reach out for the larger paying jobs that command the admiration of others. We furnish you a progressive program of investigation throughout the fall and winter for next spring's usefulness and profit. Our coaching is as good as private—it is personal, clear and direct to you. Come, write today about our methods for expanding your future opportunities. Full information is free.

- ☐ Heating and Ventilating Engineering
- ☐ Special Steam and Water Heating
- ☐ Plumbing Design and Installation
- ☐ Warm-Air Heating
- ☐ Contracting and Estimating
- ☐ Mechanical Drafting

Saint Louis Technical Institute
4541 Clayton Avenue St. Louis, Mo.

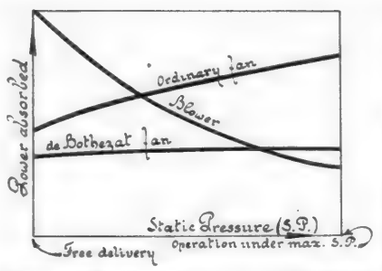


Diagram illustrating the non-overloading power characteristic of De Bothezat Disc Pressure Fans.

The diagram gives the power curves plotted against static pressure for three different types of fans.

FOR THE ORDINARY DISC FAN: The power increases as the pressure increases.

FOR THE BLOWER: The power decreases as the pressure increases.

FOR DE BOTHEZAT DISC PRESSURE FANS: The power is practically constant under any pressure from free delivery to no delivery. Thus:

FOR THE ORDINARY FAN: The motor may be overloaded and may burn out if the static pressure increases (for example a wind blowing against the fan).

FOR THE BLOWER: The motor will overload and may burn out if the static pressure decreases (for example a leakage in the ducts).

FOR THE DE BOTHEZAT DISC PRESSURE FAN: The power remains practically invariable under any pressure. This fan will never overload the motor. It is the ideal fan to be used with complete safety under any conditions.

De Bothezat Disc Fans

High Efficiency at either High or Low Pressures

Manufacturers of both blowers and fans emphasize the fact that, at low pressures, disc fans require materially less power.

De Bothezat Disc Fans have non-overloading power characteristics and thus ***work with equally high efficiency at high and low pressures.***

For any ventilation problem, consider De Bothezat Pressure Fans

DE BOTHEZAT IMPELLER CO., Inc.
1922 Park Avenue, New York City

Parkinson, Martin & Austin, Architects *Holmes & Sanborn and J. B. Armitage, Engineers*
LOS ANGELES CITY HALL

Supplying the proper atmosphere for Los Angeles officials!

In selecting "Buffalo Carrier" equipment for the magnificent Los Angeles City Hall, recently built, the architects and engineers have provided a finishing touch of perfection in one of the city's finest structures.

Bigger and finer buildings will always require better and more efficient ventilating equipment, and for these structures Buffalo fans and Air Washers are made.

Engineering offices in all principal cities are at your service.

Buffalo Forge Company, 480 Broadway, Buffalo, N.Y.

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

1878 "Buffalo" 1928 — "Air Engineers for Fifty Years"

The SIROCCO for Industrial Heat-

Imagine a heating unit that forces heated air where you want it, when you want it and as much as you want—that eliminates cold corners, and heat pockets from large industrial areas—a unit that can be used for ventilating as well as heating! Imagine a heating unit that can be shut off all night and thrown open in the morning to heat a large area comfortably in less than 30 minutes—a heating unit that occupies the minimum of floor space and is so simple and accessible that it can be taken apart and assembled by anyone with only a few ordinary tools! Imagine a heating unit that will operate year after year with practically no attention whatever; that can be regulated to keep comfortable working conditions regardless of outside weather conditions; that puts waste heat to work and reduces expense in every manner known to scientific heating! Such a unit is the new Sirocco Unit Heater.

Companion to the World Famous Venturafin Unit Heater

Built by the makers of the Venturafin Unit Heater —the Sirocco Unit is of high velocity type for floor and ceiling applications, high or low pressure installations. It fills a decided need for adequate heating equipment in large industrial buildings, warehouses, gymnasiums and other structures of large areas where forced heat at high velocity is desirable or necessary.

Illustrated below is the 4-18 F. Sirocco Unit Heater for industrial heating and ventilating. When the Sirocco Unit is used to ventilate as well as heat, one air intake opening at the lower part of the unit is connected up with the wall box and fresh, invigorating air is drawn from out-of-doors whence it passes over the heating coils to be correctly tempered and forced out into working areas. A mixing damper and control lever regulate the amount of outdoor air taken into the unit.

Photo above (right) shows floor stand type installation of Sirocco Unit Heater—the new modern method of industrial heating and ventilating.

New Advantages and Economies

The Sirocco Unit Heater offers many important advantages for heating and ventilating large areas. It has a lower tip speed than any other unit of

American Blower

"Sirocco" TRADE MARK VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

UNIT HEATER *ing and Ventilating*

equivalent capacity, which assures more quiet and satisfactory operation. It is scientifically designed to reduce waste heat to a minimum and to actually put "waste heat" to work. It is built as only American Blower, with its vast resources, years of experience and complete facilities, builds heating and ventilating equipment. It is the most accessible unit heater on the market. It distributes heat more evenly and over a larger area through the use of specially designed Evase type discharge cowls. It ventilates as it heats—or can be used for either heating or ventilating alone. Made in twenty-eight sizes and capacities to fit every need.

A Complete Line of Unit Heaters

The addition of the high velocity Sirocco Unit Heater gives us a complete line of unit heaters ranging in types from the Universal Heating and Ventilating Units for schools, offices and public buildings; and Venturafin units for general industrial applications (stores, factories, garages and shops) to the Sirocco Unit Heater for large industrial areas where forced heat at a high velocity is advisable or necessary.

Send for Complete Information

Every user, buyer or dealer of heating equipment, as well as architects and engineers, should have complete information on the Sirocco Unit Heater. Fill out and mail the coupon today and we will send it to you free of charge and without obligation.

Above is shown a ceiling type installation of the Sirocco Unit Heater—the position of the unit does not in any way interfere with its efficiency.

Above shows the accessibility of the Sirocco Unit Heater—by removing two locking nuts, the heating element slides out like a desk drawer—by removing a few bolts the entire fan assembly can be lifted from the unit with shaft and bearings intact. All Sirocco units have these features.

(796)

AMERICAN BLOWER CORP., DETROIT, MICHIGAN
CANADIAN SIROCCO CO., LTD., WINDSOR, ONTARIO
BRANCH OFFICES IN ALL PRINCIPAL CITIES

C O U P O N

I am interested in the Sirocco Unit Heater for industrial heating and ventilating as applied to the subjects checked on right.

Name _____

Firm _____

Full Address _____

☐ Factory ☐ Warehouse
☐ Shop ☐ Gymnasium
☐ Garage of large area

Industry is air-conscious now

Industry today knows that atmospheric conditions in factory, mill and office affect the efficiency of the workers—the quality and quantity of work done.

A new era opens for the ventilating engineer who keeps in touch with the rapid changes of the day.

What these changes are and how they can be met are reflected in the heating, ventilating and air-conditioning exhibits at the National Exposition of Power and Mechanical Engineering, Heating and Ventilating.

Come and see the latest equipment. And see the related power equipment.

Come and talk to the manufacturers' engineers—glad to discuss your problems in the light of their own specialized experience.

Heating and Ventilating engineers will find that time spent at this exposition is a splendid investment. Note the place and dates—Grand Central Palace, New York, December 3 to 8. By all means come.

GRAND CENTRAL PALACE NEW YORK
DEC 3–8 1928
The Power Capitol of the World
7th NATIONAL EXPOSITION
POWER & MECHANICAL ENGINEERING
HEATING & VENTILATING

Management International Exposition Company, largest industrial exposition organization in the world

2870

"Heat with Unit Heaters"

COMET UNIT-HEATERS

for Flexible *and* Economical Heating

BECAUSE of their flexibility, Comet Unit Heaters are ideally adapted to many types of buildings. They ventilate as well as heat. Cheaper to install than direct radiation and cheaper to operate.

Air-bound pounding, waterlogging or freezing will not affect the Comet Unit Heater with its sturdy, welded construction. The core contains no cast, soldered or brazed materials.

Every one is tested under hydrostatic pressure and guaranteed to withstand unlimited steam pressure.

Comet Unit Heaters will also resist rust, corrosion and oxidation for the *lifetime of the entire heating system.*

The scientific design and construction of the tubes give unusually large heating surface.

Comet Unit Heaters are furnished in both overhead and floor mounted types in several sizes to meet every building requirement.

Write for Bulletin No. 105 giving guaranteed capacities

Fans · · Blowers
Unit Heaters ·· Air Washers
Furnaces

NEW YORK BLOWER COMPANY

General Offices:
3151 SHIELDS AVENUE
Chicago

REPRESENTATIVES IN PRINCIPAL CITIES

Specify Rome Helicalfin Tubes

for Air Heating and Cooling Equipment

Maximum Radiator Service
Lowest Air Friction Loss
Complete Line of Sizes

Flat continuous radiating fin—no corrugations.

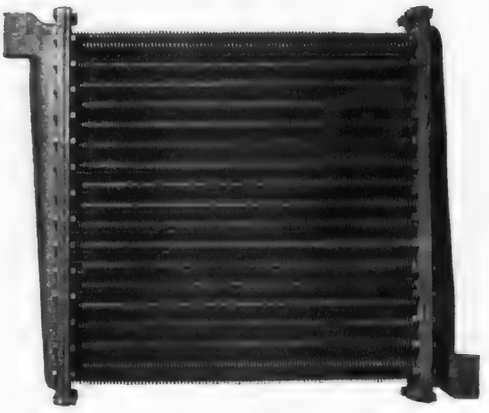
Quantity production.

Small sizes for refrigeration condensers, oil coolers, etc.

Medium sizes for unit heaters and blast heating and ventilating systems.

Large sizes, ends threaded for bathroom heaters, direct factory heating and concealed direct radiation.

Furnished ready for installation, with guards if desired.

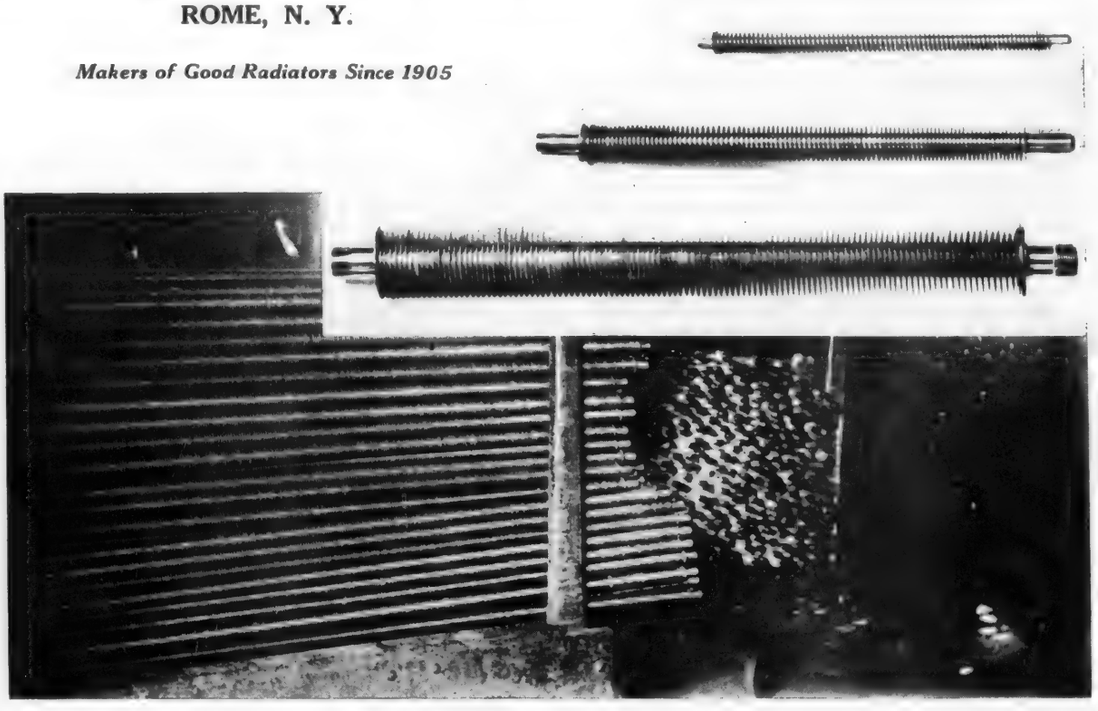


Seamless Copper Construction

Engineering data covering the performance of Rome HELICALFIN Heaters has been prepared by a nationally known test engineer and is available upon request.

ROME-TURNEY RADIATOR COMPANY
ROME, N. Y.

Makers of Good Radiators Since 1905



Plant of Eternit, Inc., St. Louis, Mo., Main building, 904 feet long, 154 feet wide, 35 feet high

Eternit, Inc., bought Skinner Brothers Heaters *because:*

they knew Skinner Brothers' reputation for solving difficult heating problems

They knew that, not only did this company originate the Unit Method of heating but that, for over a third of a century, they have been applying it to buildings all over the country with marked success. Naturally this vast accumulation of heating experiences has equipped them to provide effective heating even under the most difficult conditions.

Thousands of installations, many of them in buildings formerly thought of as *impossible to heat*, form the foundation for the Skinner reputation.

To further that reputation, Skinner Brothers not only guarantee to provide adequate heat to overcome all heat-losses but to circulate that heat *equally* to every cubic foot of the *work-area*, without allowing valuable B. T. U.s to waste themselves in the unused spaces overhead.

You, too, will find it well worth while to give careful consideration to the reason for the selection of Skinner Heaters by a large corporation like *Eternit, Inc.* Feel free to call on a Skinner man without obligation.

Skinner Brothers Mfg. Co. Inc.

1470 S. Vandeventer St. Louis, Mo.

***work-area* Heating**

New York Office 1710 Flatiron Bldg.

Branches in 30 principal cities

H9

Originators of the Unit Method of *work-area* Heating

Armstrong steam traps

are dependable and economical

THE dependability of Armstrong Traps has been proved by the thousands that are in successful operation in nearly every industry. The unique design provides all the desirable characteristics which a steam trap should have without inflicting any faults.

Armstrong Traps are water sealed against the leakage of steam. They are always full of water. Their operation is positive. The valves are either wide open or tightly closed. This reduces the possibility of clogging and eliminates wire drawing which causes scoring of valves.

The swirling action of the water in passing through the trap stirs up the sediment and scum and carries them out with the condensate. Air which collects above the water in the trap is discharged ahead of the condensate.

Heat treated chrome steel valves and seats keep down wear and prevent leakage. The small size for a given capacity reduces the first cost, and makes installation a simple matter. No foundations, brackets or special fittings are necessary and the completed job is neat in appearance.

Armstrong Traps save steam, help unit heaters to operate more efficiently, and seldom require any attention.

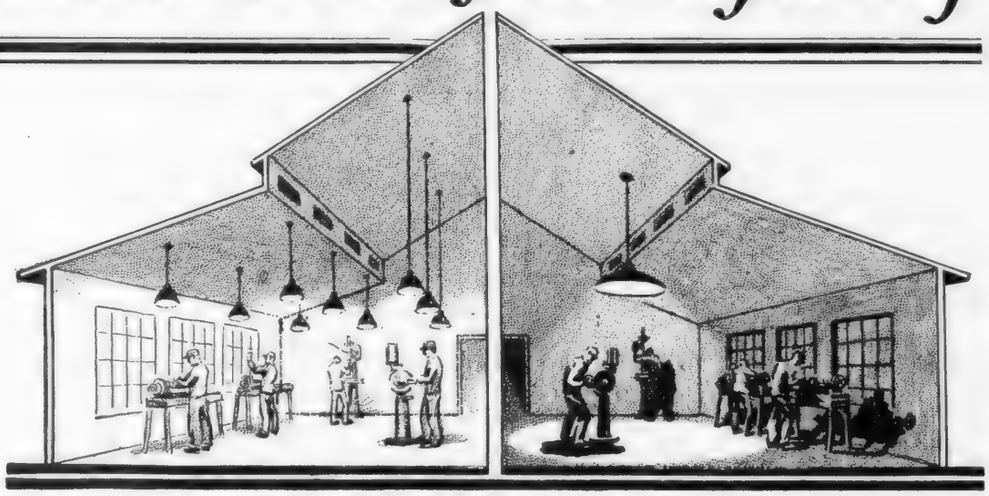
ARMSTRONG MACHINE WORKS

346 Maple Street
THREE RIVERS, MICHIGAN

DISTRICT REPRESENTATIVES IN 36 CITIES

H & V 10—Gray

...For *better* industrial *heating* take *a lesson* from your *lighting*



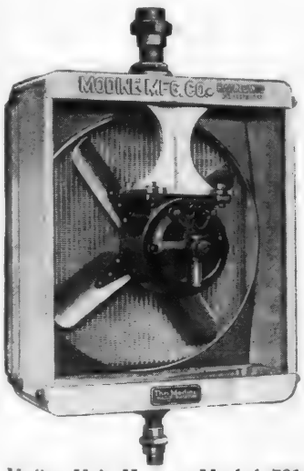
AT the left above, a number of small lights spreading their rays uniformly throughout the working area—at the right, one big arc to light the same space. Which would you choose for your plant? Which will supply ample light where it is needed? Which will eliminate dark spots? With which could you control the lighting best and use current only when needed?

The greater efficiency and economy of a number of smaller lights is startlingly obvious.

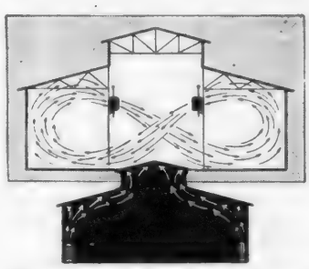
With heating it's the same. Modine Unit Heating is comparable to the efficient lighting shown at the left.

Modine Unit Heaters suspend from the steam line 10 to 14 feet above floor level, just as lights are installed overhead. They deliver heated air down over a wide floor area, just as light is reflected down. Each Modine may be operated independently, as needed, just as lights are operated independently.

Modine Unit Heaters are a revolutionary improvement. They provide better heating at lower first cost and lower operating cost. Send for the interesting, new Modine Catalog which will give you all the facts.



Modine Unit Heater Model 701. Weighs only 125 lbs. Takes the place of nearly two tons of cast iron radiation.



A comparison of the Modine Method with cast iron radiation. Note above how the Modine delivers the heated air down and keeps it there. Below, the course of heat circulation with cast iron radiation—the roof of the building is heated first.

MODINE MANUFACTURING CO.
1707 RACINE ST. *(Heating Division)* RACINE, WIS.
Branch offices in all large cities
London Office—S. G. Leach & Co., Ltd., 20-30 Artillery Lane.

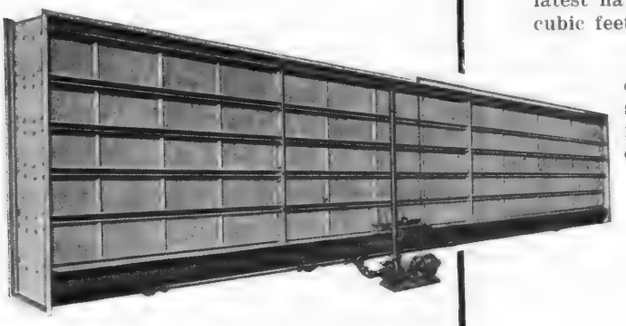
Modine *Unit* HEATER

A MODINE Product

FOR STEAM, VAPOR, VACUUM, HOT WATER HEATING SYSTEMS

Typical installation of small GAF Automatic Filters. 3 Units at the Manufacturers & Traders Trust Co., Buffalo, N. Y. Total capacity—50,000 C.F.M.

All capacities and all types for all air-cleaning applications.



Typical large G.A.F. Automatic Air Filter installed at the Lincoln Hotel, one of the newest and largest in New York. Normal capacity of this unit is 105,000 C.F.M.

What Constitutes *"Leadership"*?

WHAT is it that establishes a piece of equipment as a leader in its field?

In the case of Air-Cleaning Filters specifically,—Is it design and construction? Is it number of installations? Is it size of installations? Is it the character of the concerns that select a particular filter? Is it performance in service? Is it general all-'round satisfaction to the user?

Gauged by any one or all of these tests, the top-rank position of the G.A.F. Air Filter,—the **100% automatic** filter,—is clearly established.

Recently, the G.A.F. Automatic Air Filter has been selected for the largest air-cleaning undertakings so far attempted, the latest having a capacity for cleaning over a million and a half cubic feet of air per minute.

The reasons for the selection of the G.A.F. Filter are clearly defined. They are brought out in the new descriptive catalog just published. Every Architect, Engineer, Contractor and Business Executive should have a copy.

Write for Your Copy—Today

General Air Filters Corp.

Division The W. B. Connor Co. Inc.

369A Lexington Ave., New York

Manufacturers of Air Cleaning and Conditioning Equipment, Air Filters, Air Washers, Spray Nozzles

ZENITH Damper Locks Self-Locking

For ventilating systems. Automatically locks volume and splitter dampers in concealed ventilation ducts, in any position. Concealed—tamper-proof—inexpensive.

Write for complete information

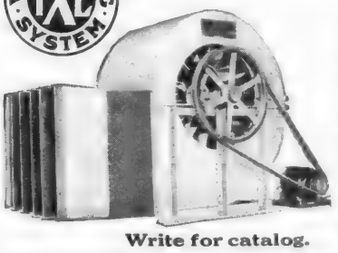
NORTHERN WEATHERSTRIP COMPANY

365-7-9 S. 1st Ave., East Duluth, Minnesota

Lakeside

VENTILATING IXL SYSTEM

Quiet *Electric Ventilator*



An electric ventilator that fills a long felt need—efficient and quiet in operation.

Easy to install—requires no tearing down of walls or ripping of floors.

Write for catalog.

LAKESIDE COMPANY, 107 Main St., Hermansville, Mich.

KAUFFMAN.

AIR DIFFUSERS

SINCE 1908

Kauffman Air Diffusers

HAVE BEEN IN USE IN

Some of America's Finest Theatres

Simple to Install—Low in Price

Graduated Air Control

AMERICAN METAL PRODUCTS CORP.

ST. LOUIS, U. S. A.

Demand the Latest Improvements in Unit Heating and Ventilating

ADJUSTABLE MOTORS are standard equipment on PeerVent Units. Note these advantages:

1. Units can be set to deliver the exact required C.F.M. capacity.
2. The C.F.M. capacity can be changed at any time to meet changed C.F.M. requirements.
3. Units equipped with these motors are truly SILENT.
4. Adjustable motors being standard equipment, no extra cost is involved.

ANOTHER STEP AHEAD

The PeerVent Unit can now be equipped with the PeerTherm Control as an integral part of the Unit, controlling the fresh-air damper.

These new PeerVent features again substantiate the statement made by an Architect some time ago: "I consider that PeerVent Units are at all times a little in advance with improvements."

Details and specifications on request.

PEERLESS UNIT VENTILATION CO., INC.

718-34 Crescent Ave. - - - - Bridgeport, Conn.

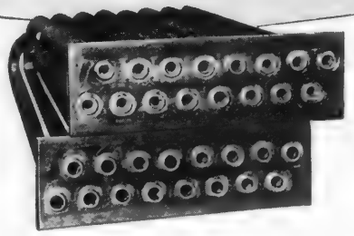
Offices in Principal Cities From Coast to Coast

PEERVENT

HEATING AND VENTILATING UNITS

SUPER-FIN *for* SUPER-HEAT

Fused Joints



WHEN installing a piping system for Super-Heat, you will undoubtedly specify welded joints throughout.

It is obviously the part of wisdom to complete the system with heating coils having construction *equally* able to stand up under the temperature.

York Super-Fin coils (with U-tube construction to eliminate expansion and contraction strains), have copper tubes FUSED TO THE HEADERS. *There are no joints to leak.* Use Super-Fin for Super-Heat or Saturated Steam. All essential sizes are available.

AN INVITATION

Southern Textile Exposition, Greenville, S. C.
October 15—26 :: Booths 305—306

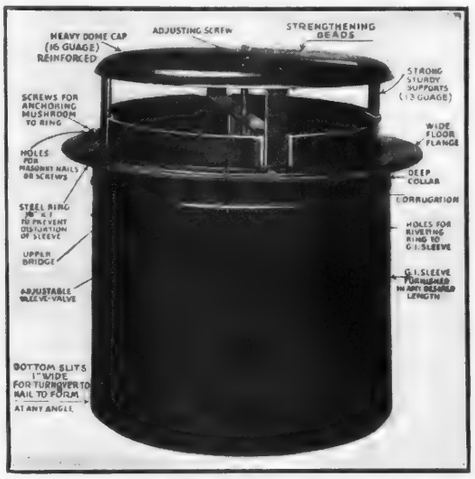
YORK SUPER-FIN

YORK HEATING & VENTILATING CORP'N
Engineered Products PHILADELPHIA

AEROVALVE MUSHROOM AIR DIFFUSER

Made of Heavy Steel

Sold with or without Sleeve


HEAVY DOME CAP (16 GUAGE) REINFORCED
ADJUSTING SCREW
STRENGTHENING BEADS
STRONG STURDY SUPPORTS (13 GUAGE)
SCREWS FOR ANCHORING MUSHROOM TO RING
WIDE FLOOR FLANGE
HOLES FOR MASONRY NAILS OR SCREWS
DEEP COLLAR
CORRUGATION
STEEL RING TO PREVENT DISTORTION OF SLEEVE
HOLES FOR RIVETING RING TO G.I. SLEEVE
UPPER BRIDGE
G.I. SLEEVE FURNISHED IN ANY DESIRED LENGTH
ADJUSTABLE VALVE-VALVE
BOTTOM SLITS 1" WIDE FOR TURNING TO NAIL TO FORM AT ANY ANGLE

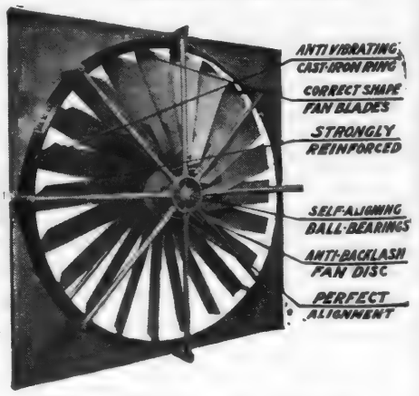
The "Aerovalve" is also made with a cast iron cap and dome disc damper adjustable from the top of cap to any desired opening. When specifying mention "Aerovalve" All Steel Mushroom or "Aerovalve" Cast Iron Mushroom, 6" or 8" in diameter, with or without g. i. sleeves.

Knowles Mushroom Ventilator Co.
202 Franklin Street, New York City

TYPHOON

Multiblade Disc Blower

Disc Blowers
Centrifugal Blowers
Belt-driven Direct-connected
Unit Drive Fans
Unit Heaters
Ventilating Systems
Air Conditioning Systems



Typhoon Products and Typhoon Systems have been installed all over the country and all over the world. Typhoon is an international standard of efficiency for cooling, heating, and ventilating systems.

TYPHOON FAN COMPANY
345 West 39th Street
New York City
Dealers' and engineers' inquiries invited

Now ... Unit Heating ... *free from trouble and repair costs*

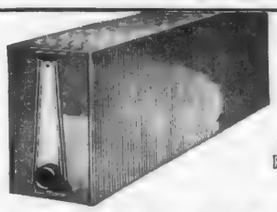
For the economical distribution of heat in
Factories
Railroad Shops
Roundhouses
Warehouses
Mills
Garages
Gymnasiums
and all industrial buildings, as well as in special process rooms where uniform heat maintenance is required.

The Herman Nelson hiJet Heater ends repair expenses and costly waste of heat—items that add so heavily to the overhead in all industrial buildings. It is built to stand the hardest wear and tear. It is leak-proof and trouble-proof.

The hiJet forces a jet of warmed air downward with sufficient velocity to dispel the cold air strata at the floor line, resulting in a uniform and comfortable temperature. This principle is new, sound and practical in plant heating.

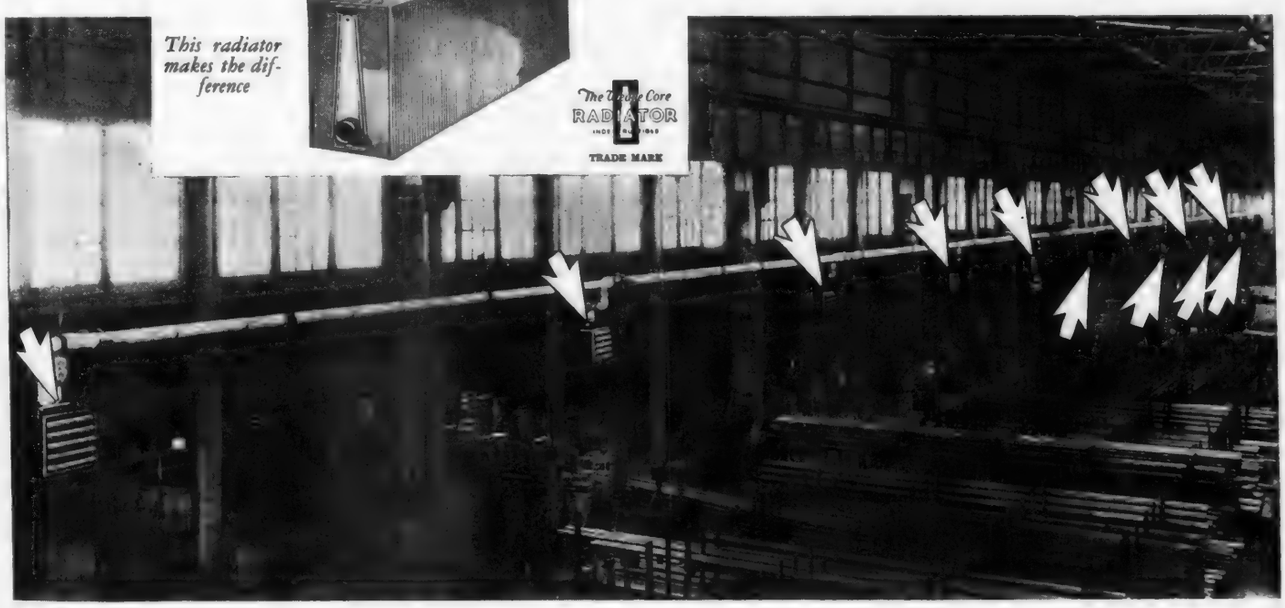
The HER-NEL-CO Indestructible Radiator used in the hiJet is guaranteed to withstand steam working pressures up to 150 lbs. It has no joints—there is no weakness—no leaks. Its construction provides free steam circulation or condensation drainage.

The hiJet offers exceptional opportunities to Heating and Ventilating Engineers and Contractors. Its sound reputation has been built up by leaders in industry, winning hearty endorsement from Plant and Business Executives. Learn more about the hiJet. Fill in and return the coupon below, and get the latest catalog giving complete information.



This radiator makes the difference

The Trade Core RADIATOR TRADE MARK



Jones & Laughlin Steel Corporation—Chicago

Manufactured only by THE HERMAN NELSON CORPORATION, *Moline, Ill.*
Builders of Successful Heating and Ventilating Equipment for Over 20 Years

Sales and Service

BELFAST, ME.	SAGINAW	GREEN BAY	DENVER
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PITTSBURGH	CHICAGO	DALLAS	TORONTO
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GRAND RAPIDS	MILWAUKEE	OMAHA	CALGARY, ALTA.

The HERMAN NELSON hiJet TRADE MARK HEATER

GET FREE BOOK

THE HERMAN NELSON CORPORATION
Moline, Illinois

Gentlemen:
Please send me book No. 12 containing the facts about the Herman Nelson hiJet Heater.

Name..... *Firm Name*.....
Address..... *Type of Building*.....

"Tentacular"

If you are interested in higher power transmission efficiency at small cost—against low efficiency at high cost, as is often the case—"TENTACULAR" should appeal to you.

"TENTACULAR" will operate on short centers without an idler. However, some other systems can do that too, but none will approach the incomparable high efficiency of "TENTACULAR" which, in addition, is very much cheaper and easier to install.

For ventilating fans there is nothing like a noiseless "TENTACULAR DRIVE"

Write us and let us explain to you how money and unnecessary equipment can be saved in better power transmission.

Typical "Tentacular" Drive 100 H.P.

ALEXANDER PHILADELPHIA

Alexander Brothers, Inc.

19 South Street, PHILADELPHIA, PA.
Sole Makers of Tentacular Transmission Belting
Branches and Distributors in All Principal Cities

TURTLEBACK
TRADE MARK

Fresh Air Without Drafts

It is not the amount of air admitted by a diffuser that counts for its efficiency as much as the manner in which the air is delivered. With the TURTLEBACK a greater velocity of air may be maintained without annoyance to those in the immediate vicinity.

An added feature that makes TURTLEBACKS desirable is the ease with which they are installed. Simply adjusted, and rigid when locked in place by center set screw. Made of cast iron, unusually strong, and economical, requiring no replacements.

Write for illustrated catalog

VENTILATING PRODUCTS CO.
2800 Cottage Grove Ave., Chicago, Ill.

For Heating and Ventilating Use

Specialized Experience

Our familiarity with the power problems of exhaust fan and unit heater manufacturers comes from actual experience in supplying thousands of motors for this type of equipment. An important advantage to you in selecting a motor for your product.

A.C. & D.C. — 1/30 to 2 H.P.

The Emerson Electric Mfg. Co.
2018 Washington Ave., St. Louis, Mo.
806 W. Washington Blvd., Chicago, Ill.
50 Church St., New York City.

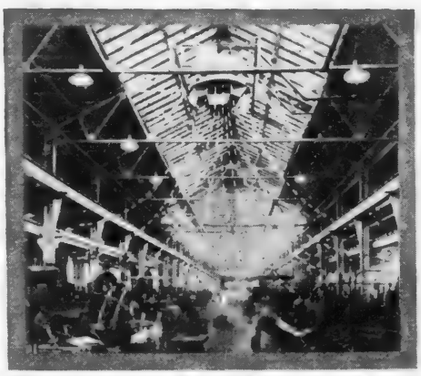
EMERSON
MOTORS
and FANS

WING FEATHERWEIGHT

"Accelerated Diffusion" of Heat

secures healthy working conditions and prevents heat loss

JUDGE a heating system by its ability to prevent conditions that interfere with the productivity of your workmen. Natural, healthy working conditions, without noticeable extremes of heat or cold, require a uniform distribution of temperature throughout the building.

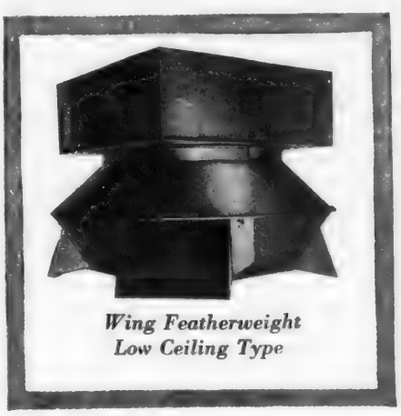


Warm currents directed downward at an angle mix quickly with floor-level air.

The Wing Featherweight Unit Heaters accomplish this, not by blowing currents of hot air on the men at work, but by *accelerating the diffusion* of the heated air with the cold. The outlets of the Wing Heaters are designed to effect this by keeping the whole volume of air in a building in continuous, gentle motion.

By speeding up the diffusion of heated air currents, Wing Heaters anticipate the tendency of warm air to rise. This limits the accumulation of hot air under the roof or ceiling. At the same time the fans of the Wing Heaters continually displace overhead air and keep it mixed with the air beneath.

In a Wing heated plant the temperature 42 feet above the floor is rarely more than 20° higher than that at the 5-foot level (say, 65° to 85° in 37 feet).



Wing Featherweight Low Ceiling Type

With a Wing Heating System you will have a uniform, easily controlled temperature with economical steam consumption. You'll find, too, that the Wing system heats the building up very quickly in the morning.

Wing heating experts are always ready to give your plant, or plans, careful study and make suggestions.

Our new Bulletin, just off the press, will prove interesting reading for a man with a heating problem on his mind. Write for a copy today.

Wing Featherweight High Ceiling Type

L. J. WING MFG. CO. **158 W. 14th Street** **New York, N. Y.**

UNIT HEATERS

ACID
Fume Ducts

FOR ducts carrying corrosive fumes, such as those from a chemistry laboratory or a battery room, there is no available material to equal Alcumite.

This alloy is highly resistant to practically all corrosives in gaseous form, and so requires no protective coating or covering.

Alcumite sheet has the strength of steel, and, being much lighter than lead or lead-lined sheet, requires no heavy supporting framework.

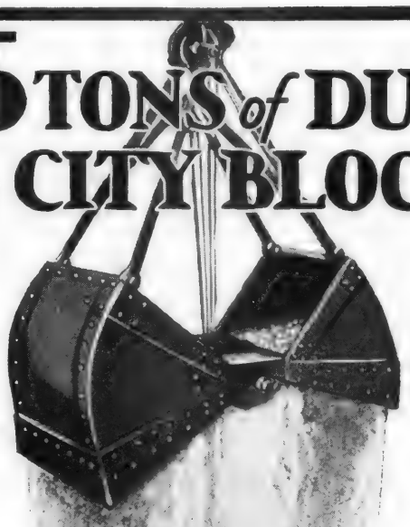
Alcumite ducts are formed with the same tools and as easily as those of sheet steel.

Complete information is given in our bulletin "Structural Applications of Alcumite." Send for it.

Alcumite is produced only by

The DURIRON COMPANY
DAYTON · OHIO

45 TONS of DUST per CITY BLOCK!



Protect Your Next Building from this Evil!

Imagine a giant bucket dumping 90,000 pounds of dust over the average city block! This is approximately the amount of dust, sand and soot that is deposited by the air in the average twelve month period! And this is the reason why air-filtration has become a vital necessity which demands the serious consideration of every architect, engineer and builder. This costly evil must be calculated from three points of view.

First, dust carries the germs of deadly diseases;
Second, it quickly ruins interior furnishings;
Third, it adds hundreds of dollars yearly to cleaning costs.

Install the Protectomotor Panel Air Filter in your next building and you are guaranteed the delivery of dry, clean air that is *actually 99-9/10% clean!*

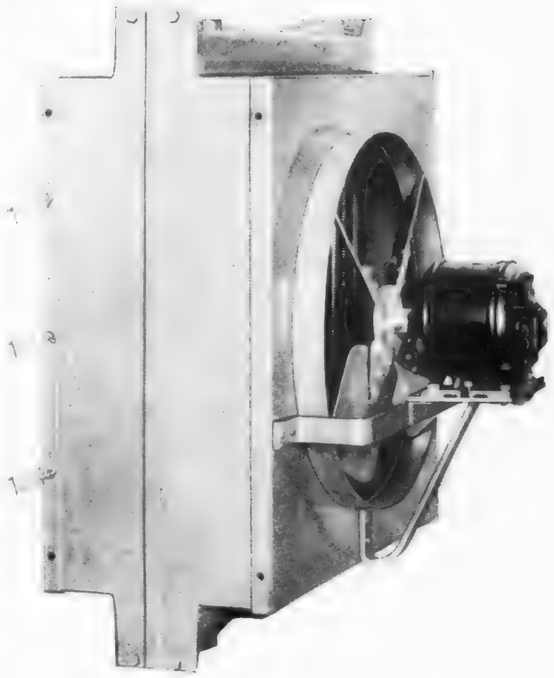
This is the simplest air filter known. Consists of a fine texture felt filter medium formed in pockets over radial rust-proof wire screen fins, mounted in rugged metal frames. Inexpensive to install. Costs practically nothing to maintain as no oil drains or cleaning tanks are needed. Operates from 2 to 6 months without cleaning, depending on conditions, and then takes only about half a minute per panel to remove all accumulations with our special vacuum cleaner. Moreover, the resistance can be kept below any specified static pressure drop.

Write for a copy of our Catalog.

STAYNEW FILTER CORPORATION
109 N. Water St., Rochester, N. Y.

PROTECTOMOTOR
REG. U.S. PAT. OFF.
Perfect Positive Protection
PANEL AIR FILTER

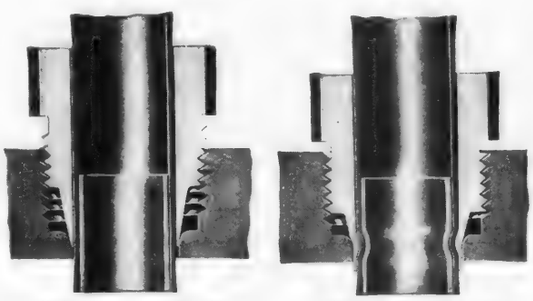
The New TWINFAN Type "V"



The Twinfan Type "V" is an economical and efficient heating and ventilating unit where large capacity is not necessary.

It is smaller in size and capacity but in all other respects is the equal of the larger Twinfan Heaters, which have an established and enviable reputation with the trade.

All Twinfan units employ the new lightweight copper radiator developed by Twinfan engineers, with one-piece headers and screwed ground joints, employing no solder, no welding, no gaskets.



Before Joint is Formed — After Joint is Formed

Full information regarding the new type "V" Twinfan Unit is contained in our Bulletin No. 215, a copy of which will be sent on request.

Twinfan Type "V" Unit Heater showing installation with floor stand.

DWYER EQUIPMENT CO.
4534 W. NORTH AVE. CHICAGO, ILL.

HEAT WITH WINFAN UNIT HEATERS

When such modern buildings install Athey CLOTH-LINED weatherstrips

—there is only one answer. No matter how thoroughly a building may be constructed, Athey Weatherstrips will pay for themselves in less than three years with just the saving in fuel, without accounting for the enormous saving in the handling of ashes, fuel or reduction in cleaning.

ATHEY Cloth-to-Metal contact weatherstrips change any wood or steel window from a rattling, loose, drafty sash to one that works smoothly and quietly and is absolutely draft-proof when closed.

Why force the Heating Plant by trying to heat all outdoors when a simple ATHEY installation quickly pays for itself with the saving in fuel? (*Another Chicago office building saved 572 tons of coal in 5 months, valued at only a little less than the weatherstripping.*)

London Guarantee & Accident Bldg., Chicago, Ill.

ATHEY COMPANY

6007 W. 65th St. **Chicago, Ill**

Representatives in all Principal Cities and in Canada

A few Athey Weatherstripped Buildings that enjoy comfortable tenants and low coal bills

E-Z DAMPER GRIP-TITE Floor Vents

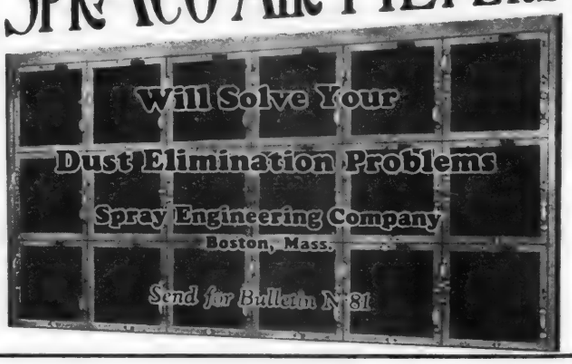
POSITIVE AIR CONTROL AT FLOOR LEVEL

ÆOLUS DICKINSON

3336-44 So. Artesian Ave. **CHICAGO**

(Some territory open for agents)

SPRACO AIR FILTERS



MANUFACTURED WEATHER

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

makes

"Every day a *good* day"

Air Conditioning

Humidification, Dehumidification
Centrifugal Refrigeration
Cooling of Public and Industrial Buildings
Temperature and Humidity Control

DRYING AND PROCESSING

Carrier Engineering Corporation

Offices and Laboratories

NEWARK, NEW JERSEY

SALES OFFICES

New York Philadelphia
Boston Chicago
Cleveland
Los Angeles
Kansas City
Washington

See our detailed data in A. S. H. & V. E. Guide.

Literature on request. Write concerning your specific problem.

FRESH AIR

for 40,000 people ....

in the world's largest auditorium!

268,000 square feet of floor space—seating capacity for 40,000 people—1,656 *tons* of fresh, outdoor air to be pumped in every hour—2,568 *tons* of vitiated air to be exhausted!

Now you have a picture of the ventilating problem at the new Atlantic City Convention Hall, Atlantic City, N. J.

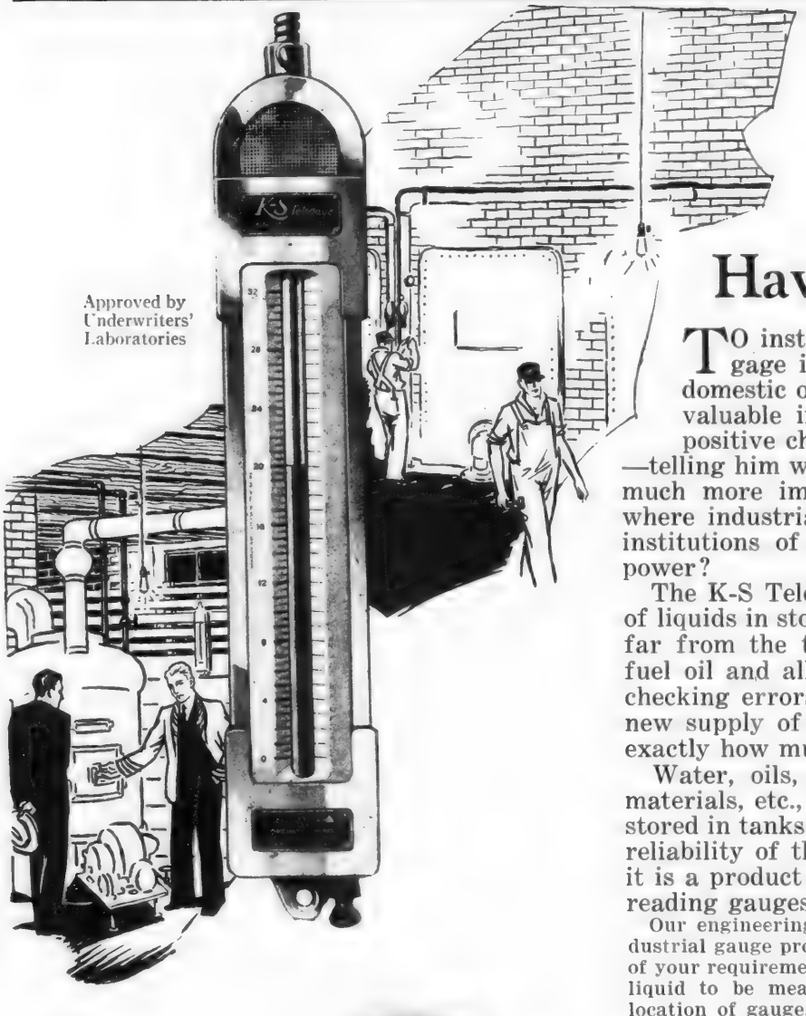
For this stupendous ventilating job—as for the great Holland Vehicular Tunnels connecting New York and New Jersey; the Alameda Tunnel connecting Alameda and Oakland, California; and other notable projects—Sturtevant Equipment was the choice of the engineers. 106 Sturtevant Fans—capable of handling 1,879,250 cubic feet of air per minute—comprise the installation!

Atlantic City Convention Hall, Atlantic City, N. J. *Architects and Engineers:* Lockwood, Greene & Co., Inc., Boston, Mass. *General Contractors:* M. B. Markland Co., Atlantic City, N. J. *Heating and Ventilating Contractors:* Riggs - Distler Co., Inc., Baltimore, Md.

B. F. STURTEVANT CO., *Hyde Park*, BOSTON, MASS.
Branch Offices in Principal Cities
Canadian Offices at: Toronto, Montreal and Galt
Also Agents in Principal Foreign Countries

Sturtevant
REG. U.S. PAT. OFF.
HEATING-VENTILATING AND POWER PLANT EQUIPMENT

THE HYDROSTATIC DISTANT READING GAUGE



Approved by Underwriters' Laboratories

Every Fuel Tank Should Have This Protection

TO install a fuel oil tank without a K-S Telegage is simply storing up trouble. Even on domestic oil burners, the Telegage has proven invaluable in giving the householder a quick and positive check on the condition of his fuel supply —telling him when and how much fuel to order. How much more important to guard larger installations, where industrial plants, apartment houses, and large institutions of all kinds, depend on oil for heat or power?

The K-S Telegage tells at a glance the actual depth of liquids in storage tanks. Placed at any point near or far from the tank, this precision instrument guards fuel oil and all other kinds of liquid storage against checking errors and costly failures. It shows when a new supply of fuel oil or other liquid is needed, and exactly how much.

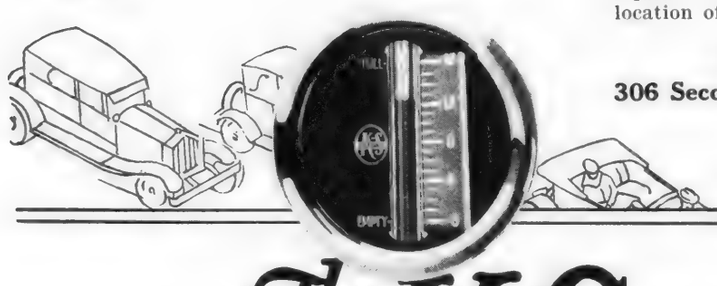
Water, oils, chemicals, gasoline, fuel oil, finishing materials, etc., are a few of the many industrial fluids stored in tanks and guarded by the K-S Telegage. The reliability of the Telegage is assured by the fact that it is a product of the world's largest maker of distant reading gauges.

Our engineering department will be pleased to discuss any industrial gauge problem, if you will write giving a full description of your requirements. Give the Baume or Specific Gravity of each liquid to be measured and the distance from tank to desired location of gauge. Descriptive folder sent on request.

KING-SEELEY CORPORATION

306 Second Street **Ann Arbor, Michigan**

Branch Offices:
New York—44 Murray Street
Chicago—472 Wrigley Building



The K-S Telegage

BE CERTAIN WITH THE *K—S TELEGAGE*

Standard factory equipment on three-fourths of all cars selling for $700 or more.

MERCOID
System of
DIRECT CONTROL

Until the advent of the Mercoid Thermostat there was not a successful room thermostat on the market which employed the combination of a mercury switch and a metal bellows.

The Mercoid Thermostat is the pioneer in its field and is fully perfected. It is the only instrument of its kind with a background of proven performance over a long period of years.

Imitations which might avoid pending and issued patents must lack the essential features to secure accurate, positive and reliable operation. ***There is but one "MERCOID."*** *Its leadership is unquestioned.*

UNIT HEATER
INSTALLATIONS GREATLY SIMPLIFIED WITH
MERCOID CONTROLS

The high current capacity of Mercoid Controls permits their use without the addition of relays, up to 10 amperes at 110 volts or 5 amperes at 220 volts, A. C. or D. C.

This means simplicity and economy on unit heater installations. Experienced Dealers insist upon Mercoid Controls. They are positive in action and durable in service.

Write for complete information

MERCOID RISERTHERM

Fig. 34

For dual control of unit heaters. Easy to install. Prevents fan from operating when the radiator is cold. May be installed in either horizontal or vertical position. Clamping feature prevents slipping and permits fastening to any size pipe. Furnished to open circuit for thermostatic control when temperature drops to a predetermined point, thereby insuring economical operation.

Fig. 34 *Fig. 21*

MERCOID THERMOSTAT

Fig. 21

Designed for automatic temperature control of unit heaters and other operations where it is desired to control an electric circuit through changes in air temperature. Standard Ranges for unit heater application 38° to 60° F. and 56 to 80° F. Dual control may also be obtained by using Fig. 31 Pressure Switch in conjunction with Fig. 21 Mercoid Thermostat.

Pat. issued 1598874, 1640869, 1658013. Others pend

THE MERCOID CORPORATION

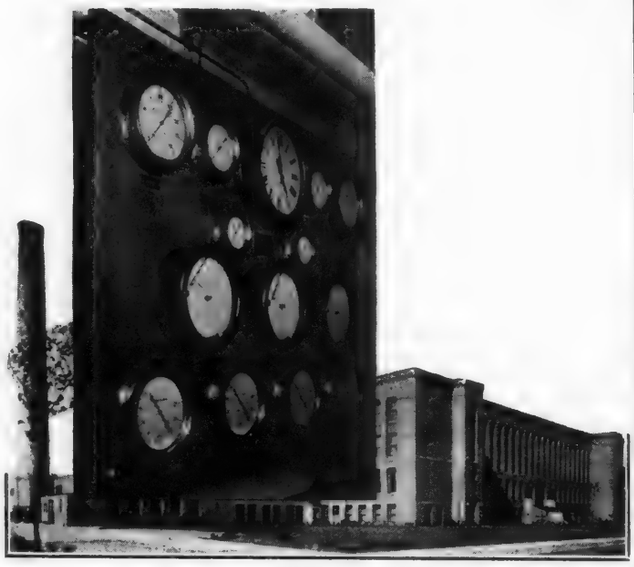
564 WEST ADAMS STREET, *Chicago, Illinois, U.S.A.*

25 CHURCH STREET
New York, N. Y.

THE MONADNOCK
San Francisco, Calif.

Cable Address "Mercoid, Chicago"

GAUGE BOARDS



American Gauge Board in East High School, Buffalo, N. Y. Heating Contractor, William E. Shaddock; Architects, F. J. & W. A. Kidd; Consulting Engineer, H. P. Dempsey, Buffalo.

American Gauges, Recording Gauges, Dial Thermometers, Recording Thermometers and Clocks are furnished in the same case for uniformity of appearance, either for wall or flush mounting. They make ideal gauge board installations.

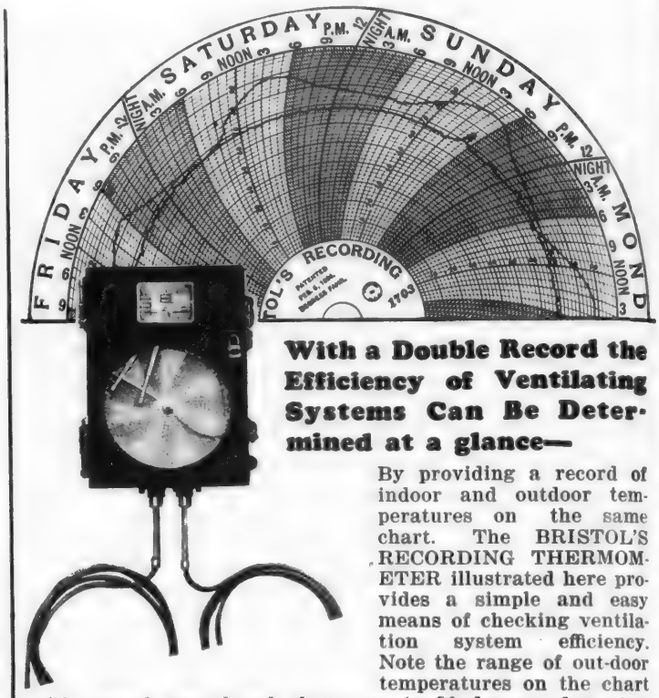
Write for the following Catalogs:

Gauge Catalog A-14,
Recording Gauge Catalog E-14,
Gauge Tester Catalog D-14,
Relief and Pop Valve Catalog V-14,
Thermometer Catalog F-14,
Dial Thermometer Catalog G-14,
Recording Thermometer Catalog H-14,
Temperature Controller Catalog R-14.

AMERICAN INSTRUMENTS

Since 1851

CONSOLIDATED ASHCROFT HANCOCK CO. INC.
AMERICAN SCHAEFFER & BUDENBERG DIVISION
338 Berry Street Brooklyn, N.Y.



With a Double Record the Efficiency of Ventilating Systems Can Be Determined at a glance—

By providing a record of indoor and outdoor temperatures on the same chart. The BRISTOL'S RECORDING THERMOMETER illustrated here provides a simple and easy means of checking ventilation system efficiency. Note the range of out-door temperatures on the chart with record reproduced above—up to 90 degrees day after day, while the temperature indoors remains about 68 degrees. Such records, always at hand for comparison at a glance, permit the immediate detection of undesirable conditions, and their correction before serious inconvenience arises. Simply and ruggedly constructed, with no complicated parts to get out of order, Bristol's Recording Thermometers will operate accurately for years with a minimum of care and adjustment.

Write for Complete Installation Details

THE BRISTOL COMPANY, Waterbury, Conn.

A Pledge

To the user this name plate is a pledge of the finest in motors. It is a protection to the judgment of architect, dealer and contractor.

It represents a product of unexcelled performance and design, and an organization of unprecedented growth and development.

Write for Bulletin giving interesting information to all motor users.

BALDOR ELECTRIC CO.
4356 Duncan Ave., St. Louis, Mo.

And Now

Time-O-Stat

a new development in automatic heat control

THE Time-O-Stat Temperature Regulator ushers in a new era of ultra-reliable temperature control. Never before has an instrument of such beauty, precision and simplicity of construction and operation been offered.

The Time-O-Stat is furnished in beautiful silver plate or statuary bronze. It is distinctive, both in line and finish, made to harmonize with the most fastidious surroundings.

Time-O-Stat is adaptable for all types of low voltage controls. By employing a 20 volt motor to operate the draft and damper control, all conduit is eliminated, reducing the cost and making a neater installation. In construction as well as operation, the Time-O-Stat is the simplest temperature control device on the market. Service requirements have been cut to an absolute minimum by vital improvements in design and construction.

Among the many features provided by the Time-O-Stat are the following: a Seth Thomas 8-day Clock of supreme accuracy and durability; a General Electric power unit in the electric control motor, famous for dependable performance; a Tycos Thermometer and a snap action contact blade feature, providing maximum temperature control accuracy with an absolute minimum of necessary adjustments. Consider this astounding array of selling features!

Exclusive sales-service dealers are now being established in all cities. Literature descriptive of the Time-O-Stat Temperature Regulator will gladly be sent on request.

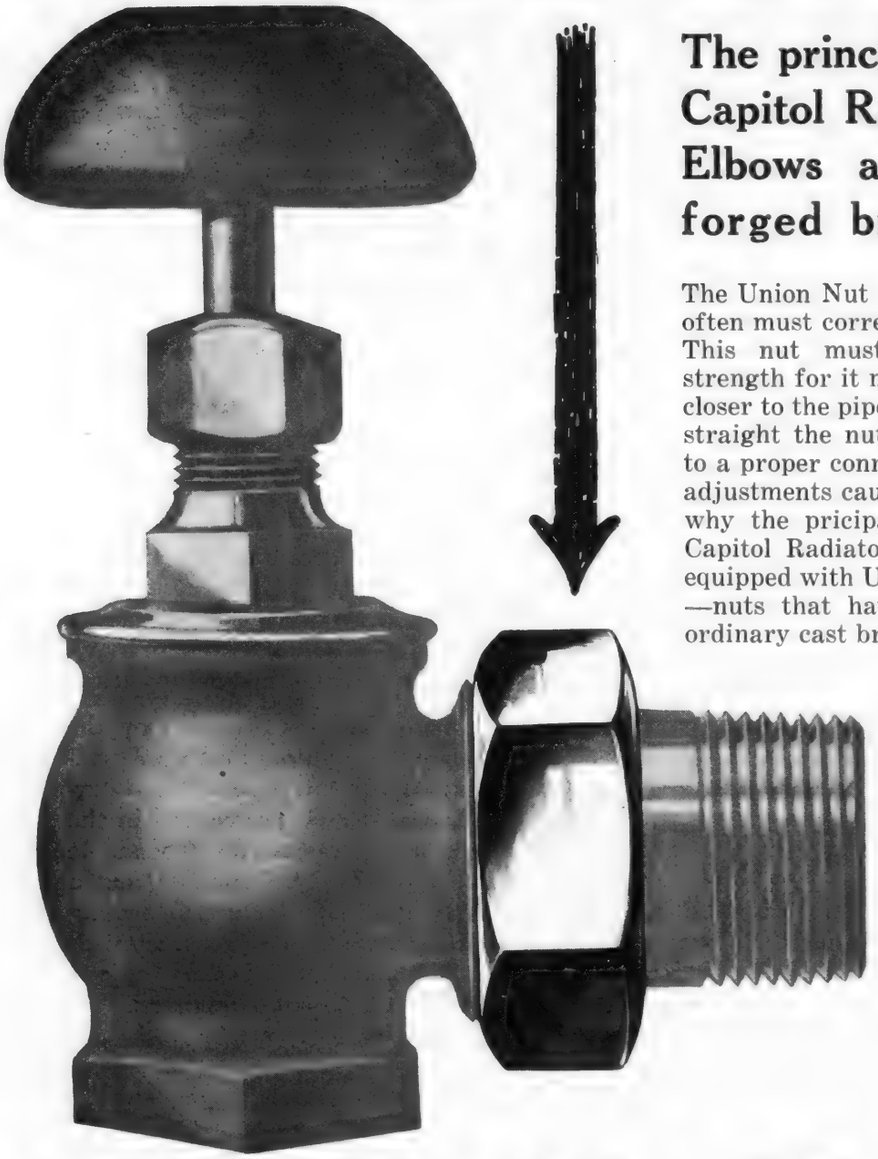
Time-O-Stat

ADAPTABLE FOR COAL, GAS AND OIL

TIME-O-STAT CORPORATION · · · MILWAUKEE, WIS.

CAPITOL

—and Now Union Nuts of FORGED BRASS!



The principally used sizes of Capitol Radiator Valves and Elbows are Equipped with forged brass Union Nuts!

The Union Nut of Radiator Valves and Elbows often must correct minor errors of installation. This nut must therefore have exceptional strength for it may be used to pull the radiator closer to the pipe line, or if a riser is not exactly straight the nut is called on to force the pipe to a proper connection with the radiator. Such adjustments cause a terrific strain—and this is why the pricipally used sizes of all types of Capitol Radiator Valves and Elbows are now equipped with Union Nuts of FORGED BRASS —nuts that have double the strength of the ordinary cast brass nut.

Write for new Capitol Catalog showing complete line.

Capitol Steam Union Radiator Valve No. 41, shown at the left is equipped with forged brass Union Nut.

CAPITOL BRASS WORKS

DIVISION OF MICHIGAN SMELTING & REFINING COMPANY

MANUFACTURERS OF BRASS VALVES, BOILER TRIMMINGS AND PLUMBERS' BRASS GOODS

DETROIT, MICH.

What are the real facts *about automatic burner regulation?*

A NUMBER of heating engineers have the impression that the Raymond Duo-Stat is a substitute for the room thermostat.

It is not.

The room thermostat is a vital part of the Raymond system of heat regulation. In fact, it was the good regulation provided by the room thermostat when the boiler limit was carefully watched, that inspired the idea behind the Raymond Duo-Stat.

In a system automatically controlled by a room thermostat, the Raymond Duo-Stat becomes a governor or stabilizer of the entire system. It *permits* the room thermostat to turn the burner on whenever the room temperature falls below 70 degrees. But it *prevents* the boiler from building up more heat than is required to raise the temperature of the home to 72 degrees —does this by continuously and automatically correcting the limit of the boiler in accordance with every change in outside temperature.

This is a simple function—but it ends forever a great number of faults that have hitherto been present in all automatic regulating systems!

Overheating is absolutely eliminated. The chilly condition that is the aftermath of overheating, is also eliminated. All fussing with the room thermostat is done away with. A degree of heating comfort never before dreamed of is assured. Yet this luxurious governed heat is a luxury that is paid for in *fuel saved by the better regulation.*

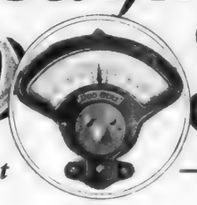
Make us prove this. Let us send you a leaflet containing convincing graphs taken under actual conditions in an average home. Naturally, the big season for the Duo-Stat is the fall. So right now is the time to get all the facts.

F. I. RAYMOND CO., Builders Building, Chicago

Originators of Automatic Dual Heat Control

The Raymond

WEATHER COMPENSATING DUO-STAT



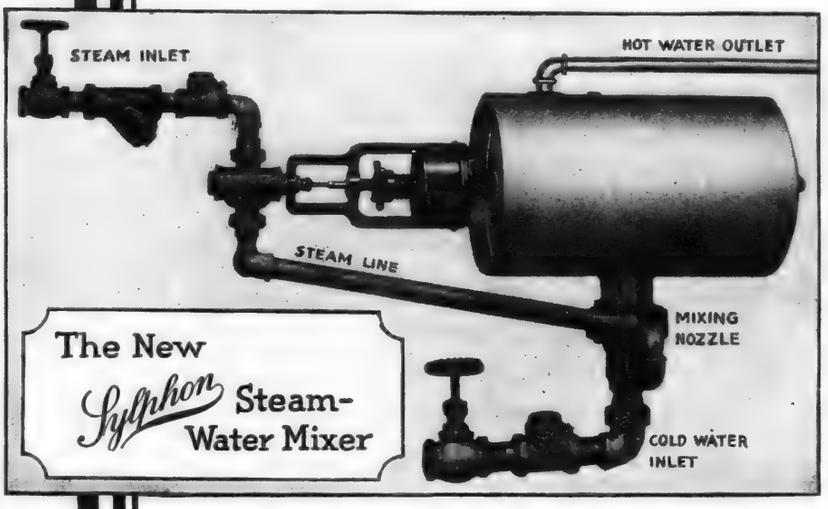
If it hasn't a Duo-Stat —it isn't fully automatic

H&V 10

The Final Solution of Your Hot Water Problems

Sylphon No. 910 Steam-Water Mixer

Positive in Action—Matchless in Efficiency—Economical in Operation.



Reproduced from actual photograph of Sylphon Steam-Water Mixer, complete as furnished.

Only Three Principal Parts

Sylphon Temperature Regulator, Mixing Nozzle and Equalizing Tank

The admission of steam to heat the water, is controlled by the efficient time-tried Sylphon Temperature Regulator. It has as its motor element the all-metal Sylphon Bellows which is an exclusive feature of Sylphon Temperature Regulators. Years of unfailing performance have placed these instruments on a plane attained by no other regulator. The steam valve of this regulator is made entirely of bronze.

The Equalizing Tank is regularly furnished of galvanized iron. On special order and at additional cost, copper tank may be furnished, with all parts in contact with steam or water, of brass or non-ferrous metals. Capacity of tank, ten gallons. No condensation loss; no traps required and no steam is used except when water is drawn.

The Mixing Nozzle is an ingenious device that mixes steam and water with minimum of noise. Designed by our engineers and made in our own plant specially for this apparatus.

Essentially the installing of the Sylphon Steam-Water Mixer consists of nothing more than hanging it in place and making the necessary steam and water connections. Detailed instructions are furnished and if followed an efficient installation is assured.

Made in our own factory by experts, tested by many installations, this new Sylphon triumph comes to you *complete,* ready to install. Once adjusted it needs no further attention.

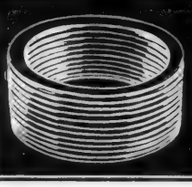
Its Wide Range of Adaptability

THE Sylphon Steam-Water Mixer, mixes steam with water to heat the water to the required temperature. By its use water from a storage tank heater can be changed from a lower to a higher temperature, thereby making available water at just the right temperature for the particular use without changing the temperature of the water supply to other fixtures.

Although comparatively new it has already proven itself and its wide range of adaptability in industrial plants for supplying warm or hot water to wash stands, showers and processes of all characters.

It is fool-proof, economical, efficient, automatic and priced at a figure that enables its adoption in each department using hot water.

We have prepared a new bulletin giving complete details of the Sylphon No. 910 Steam Water Mixer. We will gladly send you a copy. Write Dept. W

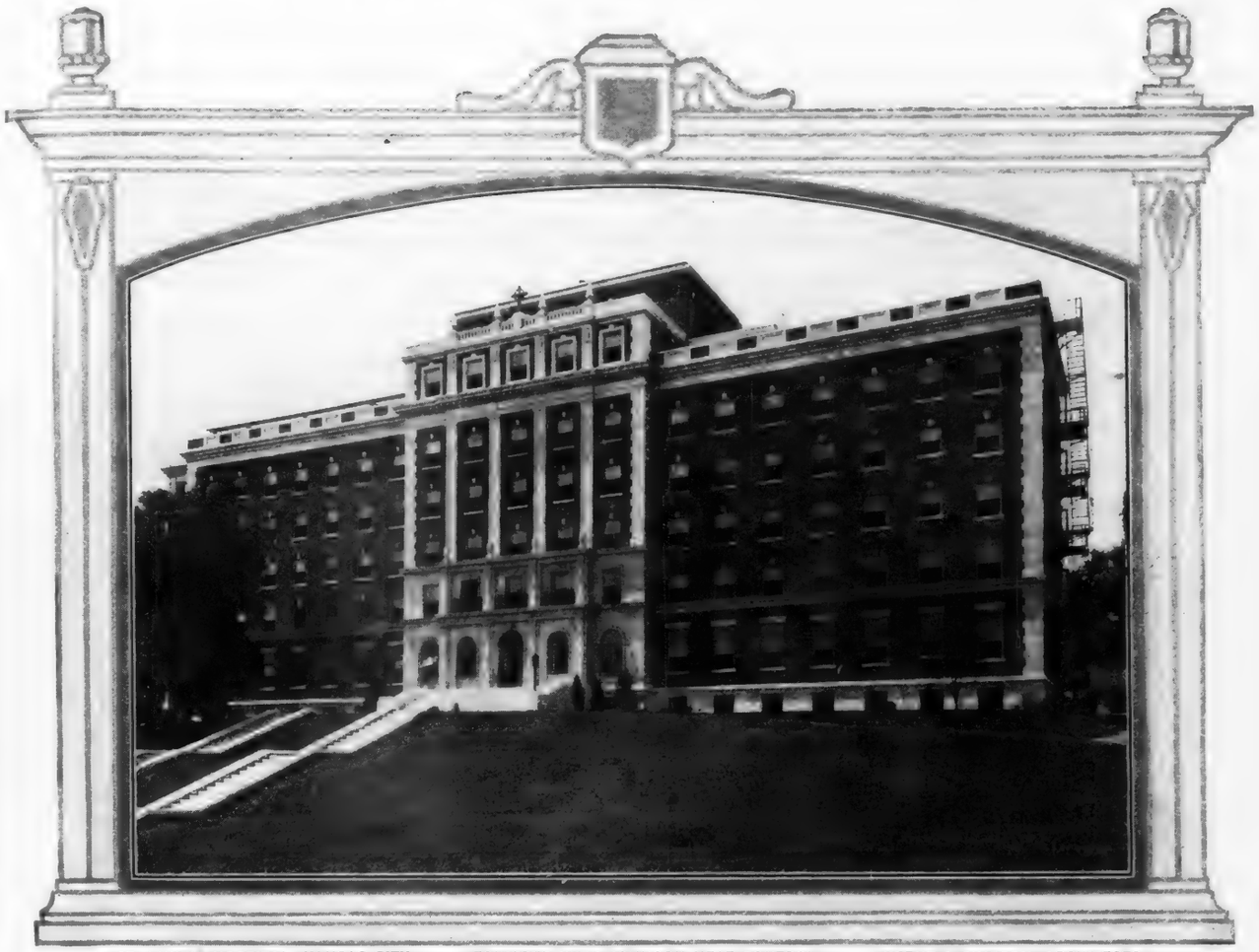


THE FULTON SYLPHON COMPANY

KNOXVILLE, TENNESSEE

THE FULTON SYLPHON COMPANY — Sylphon — AUTOMATIC TEMPERATURE CONTROL

ORIGINATORS AND PATENTEES OF THE FAMOUS SYLPHON BELLOWS



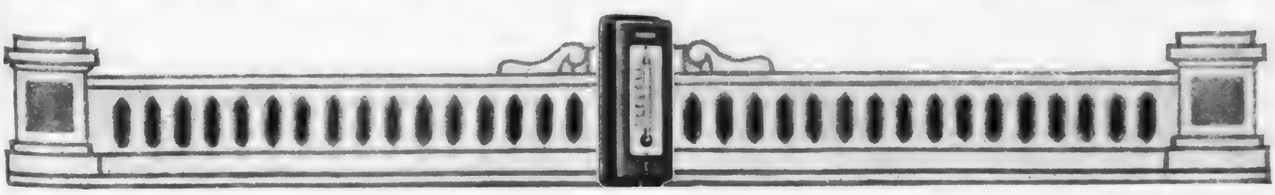
ST. LUKE'S HOSPITAL, KANSAS CITY . . EQUIPPED WITH JOHNSON HEAT CONTROL . . KEENE & SIMPSON, ARCHITECTS

THE Architect is not asked to depend totally upon the Johnson Heat Control success of forty-three long years. Nor is he urged to simply give wholehearted credence to repeated recommendation of the Johnson System by enthusiastic members of the profession. Rather this: he is asked to investigate carefully the Johnson System fuel economy, Johnson operation and accuracy and Johnson all-metal construction and durability for permanent service. The expectations of the architect's client are more than met when he specifies the Johnson System . . . . . for any building.

THE PERFECT GRADUATED, INTERMEDIATE SYSTEM OF REGULATION . . . .

JOHNSON SERVICE CO.
MILWAUKEE . . . WISCONSIN
BRANCHES IN ALL PRINCIPAL CITIES

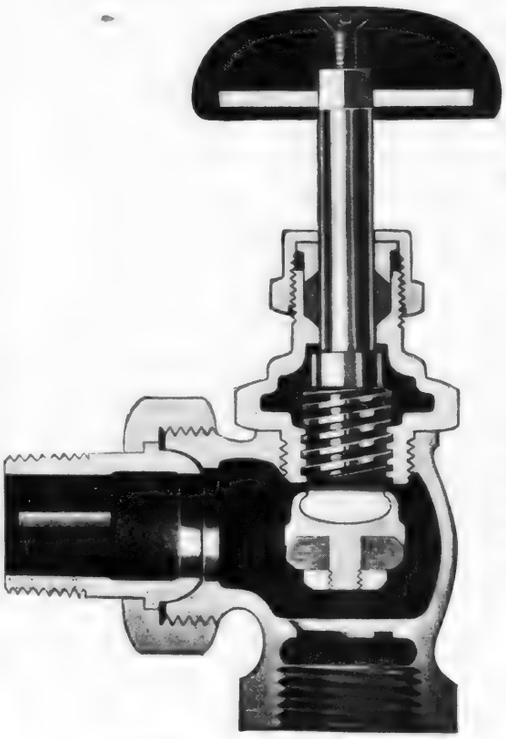
JOHNSON · HEAT · CONTROL



Something Entirely New

MARSH SPECIAL CONE DISC STANDARD RADIATOR VALVE

A Strictly High Pressure and 100% Quality Radiator Valve at Popular Competitive Prices



All Material, Workmanship and Finish are the Same as for Our Regular Packless and Modulated Lines.

Please Note Construction

Cone Disc; Bevel Seat; Lift; Drainage; Large Stem Diameter; Quick Opening; Overhanging Bonnet Hexes and Full-Sized Packing Chamber with Gland Follower.

All Important and Valuable Points

Fig. 150—Angle
Fig. 250—Globe
Fig. 350—R. H. Offset
Fig. 450—L. H. Offset
Fig. 550—Back Offset

Radiator Valve EFFICIENCY and ECONOMY depend upon TWO VITAL POINTS

FIRST: Seal against leakage through Valve Seat, and
SECOND: Against leakage of steam, water or gases from system through bonnet or around valve stem; further against the taking in of air in a vacuum system, through stuffing-box nut.

NOW, AS TO THE FIRST POINT

Marsh Cone Discs will not crack, or Valves leak through seat.

NOW, AS TO THE SECOND POINT

We call particular attention to the **full sized packing chamber with gland follower,** THE STRONGEST HIGH PRESSURE CONSTRUCTION USED FOR MILL SUPPLY OR POWER VALVES.

Leakage through Valve seat or around Valve stem, either out or in, is **lost efficiency and increased fuel cost.**

These Valves will not leak at seat or around stem.

EVERY VALVE IS FULLY GUARANTEED

MARSH VALVE COMPANY

DUNKIRK **NEW YORK**

General Sale Distributors

Edward T. Hetherington
1709 Sansom St., Philadelphia

Appleton & Liptrott, Inc.
1480 Broadway, New York

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431 So. Dearborn St., Chicago, Ill.

United States Radiator Corp'n
General Offices: Detroit, Mich.

SARCO COMPANY, Inc.
183 Madison Ave., New York

Taylor-Forbes Company
Canadian Agents Guelph, Ont.

-plays its part Well!

W.W. AHLSCHLAGER, Chicago, *Architects.*

RAISLER HEATING COMPANY, *Heating Contractors,* New York.

In the *Roxy Theatre* an ILLINOIS HEATING SYSTEM "plays its part well" and contributes much to the comfort and enjoyment of Roxy patrons.

"*The Roxy*" added to a long list of notable installations of ILLINOIS HEATING SYSTEMS gives further evidence of their outstanding merit.

Write for Bulletin 22

General Offices and Factory: 21st and Racine Avenue

REPRESENTATIVES IN 40 CITIES OF U.S.A.

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President INCORPORATED 1900

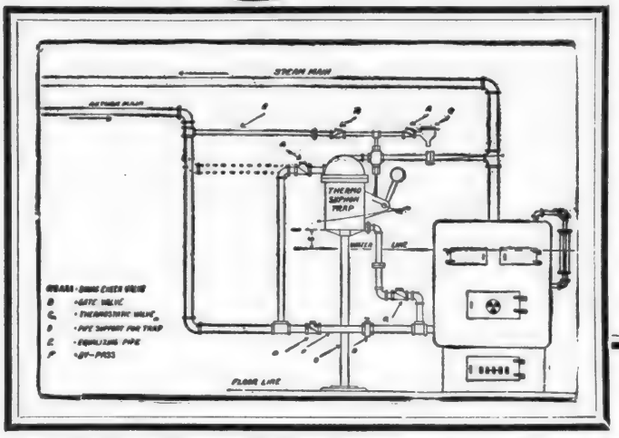
CHICAGO

For All Types of Steam Heating Systems

Don't wait until the boiler tells you

If you wait for the boiler to let you know that it needs a Thermo Syphon Trap because it will be to the tune of a large crack,—and then too late. A little precaution in the beginning saves costly replacements and inconvenience. The Thermo Syphon Trap returns all condensation to the boiler, maintaining the boiler line, regardless of pressure or vacuum. It prevents the burning or cracking of boilers due to water leaving the boiler or becoming locked in the system. It improves circulation and insures noiseless operation. Prevents air-bound or water-logged conditions. Safeguard for all types of vapor or atmospheric systems.

Send for Bulletin No. 16-HV giving full details.



Application of Thermo Syphon Trap, showing proper method of piping, for draining any heating system.

For draining vapor, vacuum or any system *without pressure on the returns*, the return line may be run direct to inlet of trap as shown by dotted line.

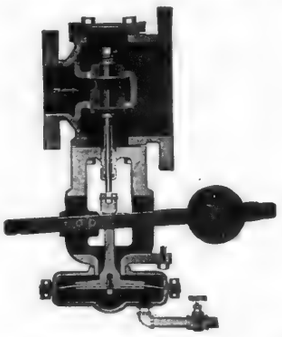
LYTTON MANUFACTURING CORPORATION

FRANKLIN, VIRGINIA

HIGH GRADE Return, Vacuum, Lifting and Separating Steam Traps, Reducing Valves, Blow-off Valves.

THERMO SYPHON TRAP

KIELEY



The Kieley Special '98'

is a phrase found in the Largest Percentage of Specifications where Regulating Valves are Required.

Designed to Fit Efficiently into Any Type of Heating System.

Kieley & Mueller, Inc.

34 West 13th Street, New York City

GRADON MANUFACTURING COMPANY

Heat Exchange Equipment

Expansion Joints — Separators

ENGINEERED GraDon PRODUCTS TRADE MARK

Engineering Dept.
Land Title Building

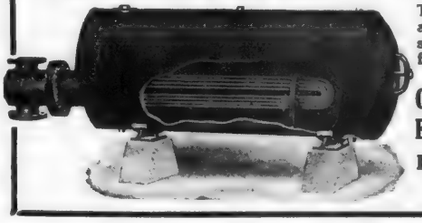
General Offices and Plant
East Tioga and Memphis Sts.

PHILADELPHIA, U. S. A.

Uniform Circulation — No Dead Ends

Heavy-gauge copper tubes are formed into U-bends to accommodate expansion and contraction, permitting each tube to expand and contract independently.

Tubes extend to opposite end of tank and are placed well to the bottom to increase efficiency of heater and cause uniform circulation throughout length of tank, thus eliminating dead ends.



Tanks and parts for all sizes carried in stock. Write us for further details.

O E. FRANK HEATER & ENGINEERING CO , Inc.

Factory and Offices at Buffalo, N. Y.

David Lynn,
Architect of The Capitol

United States Capitol,
Washington
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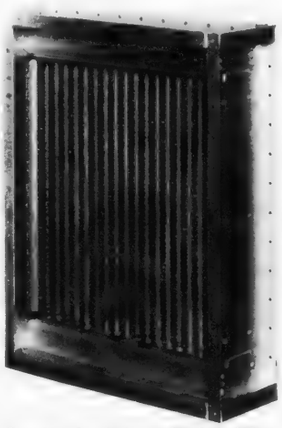
Carrier Engineering Corporation,
Air Conditioning & Refrigeration

AEROFIN
is the Heat-Surface
in
The First Building of the Land



Complete descriptive and technical data on either Low Pressure (Bulletin No. 8) or High Pressure (Bulletin H.P.-2) Aerofin will be sent without charge upon request to Newark.

IN the historic Chamber of The House of Representatives a complete scientific Air Conditioning System, installed by the Carrier Engineering Corporation, controls both temperature and humidity, cleans the air and distributes it uniformly without drafts.

We are proud that Aerofin, the modern, non-corrosive, compact, encased unit Heat-Surface, was installed as an integral part of the System which guards the health and assures the every-day comfort of the Nation's Representatives in this, the First Building of the Land.

Whatever you've wished for in a Fan System Heat-Surface you'll find in Aerofin!

AEROFIN CORPORATION

Burnham Building
CHICAGO

750 Frelinghuysen Avenue, NEWARK, N. J.
39 Cortlandt Street, NEW YORK

Oliver Building
PITTSBURGH

LOW PRESSURE AEROFIN
For pressures up to 50 lbs.
Tube-plate Construction

[*Aerofin is sold only by Manufacturers of nationally advertised Fan Heating Apparatus*]

HIGH PRESSURE AEROFIN
For pressures from 25 to 350 lbs
Continuous Seamless Tubes

No. 1
⅛ in. Side-Outlet Air Valve for Radiators

No. 3
¼ in. Bottom-Outlet Air Valve for Mains, Coils and Risers

No. 7
¾ in. Bottom-Outlet Quick Vent Air Valve for Mains and HV Stacks will not close against water

No. 2—Vacuum
⅛ in. Side-Outlet Air Valve for Radiators

No. 4—Vacuum
¼ in. Bottom-Outlet Air Valve for Mains, Coils and Risers

No. 5
¾ in. Bottom-Outlet Quick Vent Air Valve for Mains and HV Stacks

This complete line of KELLY NON-ADJUSTABLE AUTOMATIC STEAM AIR AND VACUUM VALVES is manufactured complete by the Kelly Brass Works.

KELLY valves are made to give entire satisfaction and are the result of over 35 years' experience.

The outer shell of the valve is threaded into a drop forged brass base and the valves are substantially constructed of the best grade of materials.

KELLY valves are subjected to practical steam and vacuum tests before shipping and are GUARANTEED FOR FIVE YEARS when installed and operated under proper conditions.

KELLY BRASS WORKS

226-232 W. Ontario St., Chicago, Illinois

No. 6—Vacuum
¾ in. Bottom-Outlet Quick Vent Air Valve for Mains and HV Stacks

Service The *Satisfaction*

VECO SYSTEM of VAPOR HEATING

An "Open to atmosphere" system.
The original and standard method of
Vapor Heating

VAPOR ENGINEERING COMPANY

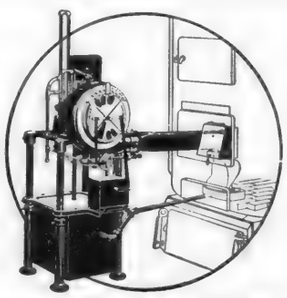
PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

Continuous Flame

No Gas Pilot
No Electric Ignition

Distributors
Write for the 1928-29 Sales Plan



McILVAINE OIL BURNER
Listed by Underwriters

Dependable Heat

Graduated Automatic Control
Mechanical Draft

McILVAINE BURNER CORPORATION
Dept. H 749 Custer Ave.
EVANSTON, ILLINOIS

8 Times Its Volume In Viscosine

Floods Through Each Midwest Automatic Horizontal Filter Cell At Every Cleaning Operation

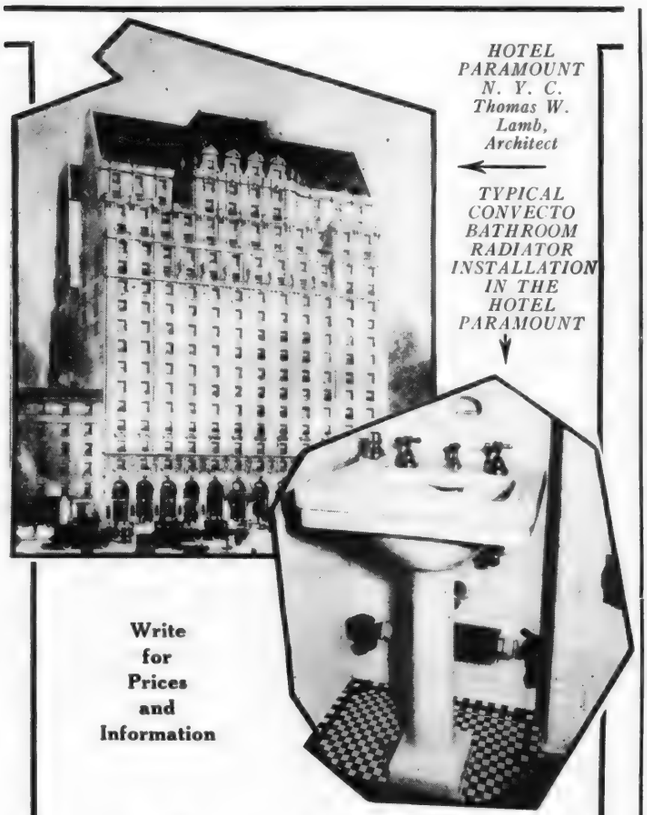
Effective, adequate flushing of the filter medium is a prime requisite of any successful impingement type air filter. Unless active, and repeated passage of viscous fluids through the filter medium takes place, dust removal is incomplete and there results a gradual building up of hard, insoluble surfaces which clog air passages and reduce efficiency.

A 9 cell Midwest Horizontal Air Filter.

The Midwest flushing header spreads a heavy curtain of oil over every inch of filter surface, traveling first in one direction, then in another. 20 gallons of Viscosine are used at the first operation to remove and soften heavy dust accumulations. Several minutes later, 20 gallons more are flooded through the cells to remove the last vestiges of dust and leave it charged for further operation.

MIDWEST AIR FILTERS
INCORPORATED

BRADFORD, PA. **Offices in Principal Cities**



HOTEL PARAMOUNT N. Y. C. Thomas W. Lamb, Architect

TYPICAL CONVECTO BATHROOM RADIATOR INSTALLATION IN THE HOTEL PARAMOUNT

Write for Prices and Information

CONVECTO
BATH ROOM
RADIATOR
"The Handsome Heating Unit"

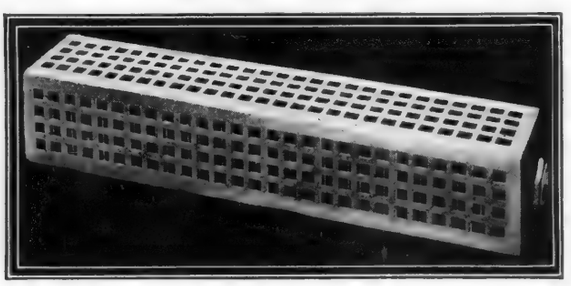
THIS splendid radiator is never in the way. It is compact, efficient, and good looking. The CONVECTO can be enclosed in an attractive cover or concealed within wall. The CONVECTO is extremely light. It is easy and inexpensive to install.

The CONVECTO is the really modern radiator built specially for the up-to-date bathroom. It will pay you to investigate.

METAL STAMPING CO.

Established in 1872

13th to 14th Street—East Ave., Long Island City, N. Y.
***Makers of* ARTONE RADIATOR ENCLOSURES**



Made in 5 standard sizes. Furnished with or without well made removable cover of lattice design—in white or colors to match bathroom.

BOOKS ON HEATING AND VENTILATION

THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS, by F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Doctor Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $3.00.

PLUMBERS' HANDBOOK, by Samuel E. Dibble. This work contains valuable data for the heating engineer and estimator, architect, building contractor and sheet metal worker, as well as for the plumber. Each subject is treated by a specialist, the section on Pipe Standards and Pipe Dies by F. N. Speller and that on Heating by Alphonse A. Adler. Size 4 x 7 in. 629 pp. 316 ills. Cloth, $4.00.

HOUSE HEATING WITH OIL FUEL, by P. E. Fansler, Associate Editor of The Heating and Ventilating Magazine. Prepared for the use of heating and ventilating engineers, heating contractors and those engaged in the oil-burner industry. One of the outstanding features of the book is the presentation of the subject of oil combustion. Over a dozen beautiful and spectacular flame photographs were made particularly for this book in order that the subject of oil combustion might more thoroughly be presented. Three chapters are devoted entirely to the discussion of salient points of the outstanding oil burners that are on the market to-day. The chapter, "Oil Burners Listed by the Underwriters," is the only authentic, chronological list of oil burners that has been listed by the Underwriters in the past. 32 chapters totaling 362 pages and more than 150 illustrations. Size 7 x 10. Price, $4.00 postpaid.

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A. S. H. & V. E. GUIDE, 1928, sixth edition, with previous sections revised and brought up to date. Includes new tables covering heat transmission from building construction, and comprehensive tables for figuring pipe sizes for gravity, vapor, and vacuum steam heating systems, based upon A.S.H. & V.E. Research Laboratory tests on one and two-pipe steam riser capacities. Size 6 x 9 in. 680 pp. and list of A.S.H. & V.E. members. Cloth $4.00.

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HEATING AND VENTILATION, by Charles W. Brabbée. This is the first American edition of the famous Heizungs-und Luftungstechnik, by Dr. H. Rietschel, and C. W. Brabbée, translated from the seventh German edition, edited and revised to make it adaptable to conditions in the United States. Supplemented by 7 charts covering steam and water heating and ventilation. Size 6 x 9 in. 332 pp. cloth $4.50

PRACTICAL STEAM, HOT WATER HEATING AND VENTILATION, by Alfred G. King. Containing 396 illustrations. The book is a working manual for heating contractors, journeymen, steamfitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8 vo. 367 pages. Price $4.00.

MECHANICS OF HEATING AND VENTILATING, by Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the results of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts printed on cloth, with lines in different colors and mounted on boards. Single charts, $1.50. Sets of ten, $15.00.

HANDBOOK FOR HEATING AND VENTILATING ENGINEERS, by James D. Hoffman. Fourth edition of this important work entirely rewritten and reset. A standard manual covering theory and practice, with special chapters on heat losses, furnace heating, water and steam heating, mechanical vacuum heating, mechanical warm-air heating, temperature control, electrical heating and refrigeration. With appendix of 75 tables. Size 4½ x 6¾ in. Pp. 478. Price $4.50 postpaid.

SHEET-METAL DUCT CONSTRUCTION, by William Neubecker. A treatise on the construction and erection of heating and ventilating ducts and the design and layout of duct fittings. Special chapters devoted to figuring areas and taking off quantities of material. Fourth edition, revised and enlarged. Size 5½ x 8 in. Pp. 225, with 237 illustrations. Cloth $3.00.

THE HEATING and VENTILATING MAGAZINE
386 FOURTH AVE., NEW YORK

Thirteen No. 62 Reed Streamline Automatic Air Filter Sections—part of a 370,000-C.F.M. installation for the J. L. Hudson Co., Detroit.

Streamline for DETROIT'S LARGEST Store

IN connection with their "refrigerated ventilation", the Carrier Engineering Corporation is now installing a Reed Streamline Automatic Air Filter totaling 370,000-C.F.M. for the J. L. Hudson Co., *largest department store in Detroit.* The air is cooled and dehumidified by being forced through water sprays *and then properly and thoroughly cleaned by the Streamline Air Filter.*

Investigate Reed for Your Needs

Reed engineers, recognized as authorities on modern air-purification, have developed a complete line of unit and automatic filters, adaptable to every requirement. It will pay you to get full data and details before making your selection. Use the coupon for convenience. REED AIR FILTER CO., Incorporated, 218 Central Avenue, Louisville, Kentucky. Offices in Principal Cities.

World's Largest Manufacturer of Air Filters

Reed Air

TRADE MARK

filters **ALL METAL**

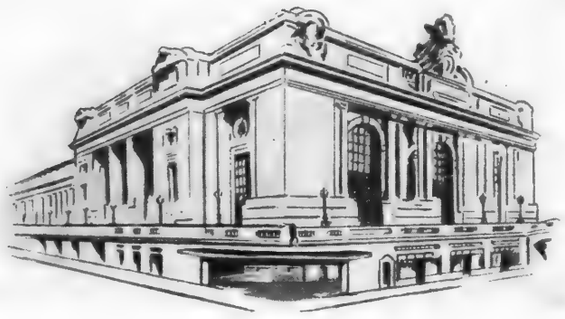
Use This

REED AIR FILTER CO., *Incorporated*
218 Central Avenue, Louisville, Ky.

Send, without obligating us, complete information on the Reed Streamline Automatic Air Filter, the Reed Unit Air Filter and other Reed products.

Name..... City..... Possible Use.....

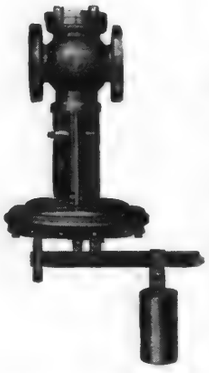
Company..... State.....



A familiar landmark to millions of travelers

Grand Central Station, in the heart of New York City, is another famous structure equipped with Mason Regulators.

Steam and hot water lines in this station are subjected to widely varying demands and conditions, but Mason Regulators insure accurate, dependable pressure control at all times.



Mason Lever Style Reducing Valve designed for heating systems requiring accurate regulation of steam at low pressure.

Designed, built and tested to work efficiently and with the least amount of attention, Mason Regulators are the choice of plant engineers in every industry because they give accurate, trouble-free service under the most exacting conditions. Write for a copy of Catalog No. 62.

Mason Regulators

MASON REGULATOR CO.

BOSTON, MASS. 2166

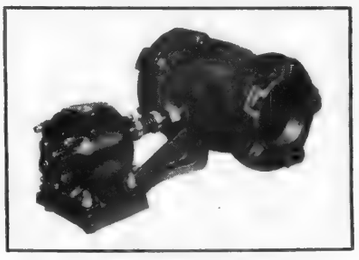
ANNOUNCING

THE KETCHUM

COMPELLER

Another Sterlco *Product*

TRADE MARK



Patent Applied For

Designed to insure positive circulation in hot water heating systems, thus increasing the heat conducting efficiency of the water and making possible a more economical and uniform distribution of heat.

Noiseless in Operation

No by-pass or check valves required

Can be operated automatically in conjunction with draft dampers or oil or gas burner control.

STERLING ENGINEERING CO.

1626-44 Holton Street

Milwaukee, Wis.

Sales Representatives in all the principal cities

The TooPas Air Filter

Well established principles

The essential principles of the TooPas are based on the 10-year success of the Phoenix, the world's standard self-cleaning filter and the only one in this class with a long record of satisfactory service.

The most important of these features is the endless-curtain type of filtering medium with the air passing consecutively through the two filtering walls. Each of these walls is an efficient filter. The two with the intervening air space offer advantages never realized in any other type. Among these advantages is the elimination of oil entrainment. This filter can be positively guaranteed against that objectionable feature.

The immersion principle of cleaning the filtering medium is another time tested feature of the Phoenix which appears in the TooPas. The oil is never disturbed and therefore qualifies itself perfectly. No changing or treating of the oil is necessary.

Combined with unique features

While the Phoenix Filter, as originally built in Germany, has met the test of service for 10 years, its construction has never been adaptable to volume production. This practical consideration has prevented it from receiving the widespread acceptance which its high standard of performance warrants.

The TooPas offers the same basic principles in a simple construction ideally suited to the average conditions in both general ventilation and industrial air-cleaning work. Every part is standardized and can be made and stocked in quantity. Assembly is easy and rapid, enabling prompt shipment on any order. The sectional design makes it possible for the architect or contractor to fit this filter into any available wall opening.

The weight is low and shipping easy. Erection can be handled without expert knowledge of filter construction. Motor drive can be used, if desired, but can be omitted without sacrificing ease of servicing.

The general service air filter embodying the double pass principle

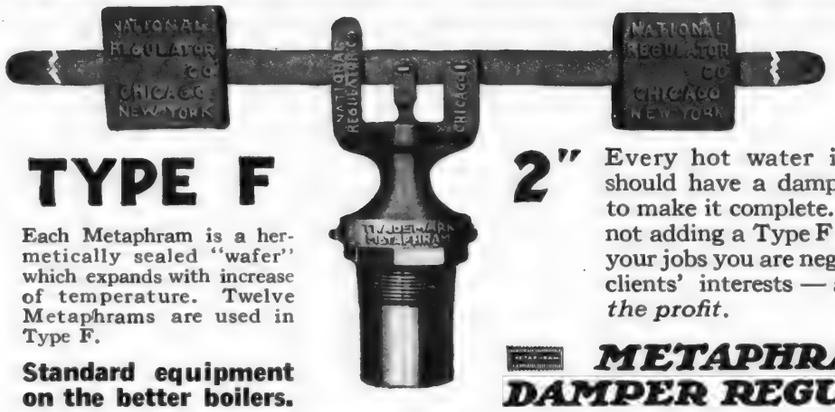
Ask for bulletin

NATIONAL AIR FILTER COMPANY

5130 Ravenswood Avenue, Chicago, Illinois

H&V10-Gray

What Have YOU Lost?



The Ideal Damper Regulator for Closed Hot Water Systems

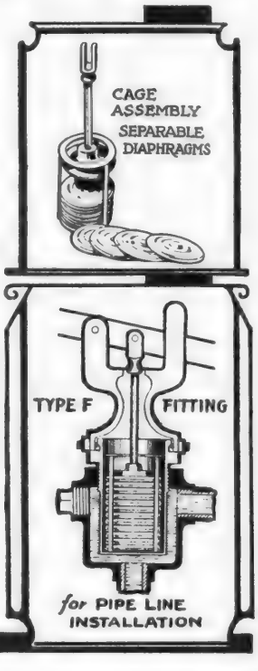
TYPE F

Each Metaphram is a hermetically sealed "wafer" which expands with increase of temperature. Twelve Metaphrams are used in Type F.

Standard equipment on the better boilers.

Every hot water installation should have a damper regulator to make it complete. If you are not adding a Type F regulator to your jobs you are neglecting your clients' interests — and *losing the profit.*

METAPHRAM DAMPER REGULATOR



Saves fuel for the owner because it maintains even temperature by regulating the drafts. Gradual action. One of the most powerful and sensitive damper regulators. Twelve Metaphram expansion units operate in a "dry well" (which is screwed into boiler opening or in special fitting or a Y in pipe line) and which is surrounded by water. Type F operates on slight change of water temperature. Removable without draining boiler.

Make installations more satisfactory to owner and *more profitable to you.* Use Type F on new or old work.

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO
Manufacturers of the National System of Automatic Temperature Control

"We keep others in Hot Water"

SIMS

Storage type water heaters are furnished with "U" tubes as illustrated, or with straight tubes and floating head, as may be desired or specified.

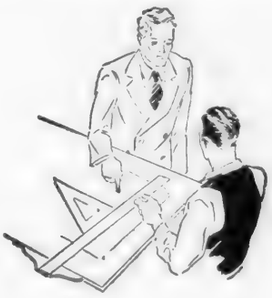
SIMS

Water tube heaters and Converters are also constructed with either straight or "U" tubes.

All heaters are produced complete in our plant. They are not an assembly of parts built by others.

THE SIMS COMPANY, P. O. Box 700 Erie, Penna.

This is Our Idea of an Efficient Air Washer — do you agree with us?



— non clogging. No fine orifice nozzles to become clogged with entrained solids in the water and cause holes in the water screen.

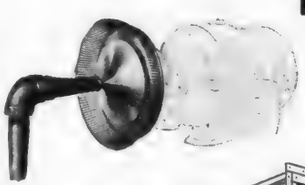
— in place of a bank of fine orifice nozzles; a motor driven centrifugal water sprayer, delivering a water screen the equal of 100 ordinary spraying nozzles.

— a single fire type nozzle large enough to permit the passage of entrained solids in the washing water; thus allowing continued use of same water.

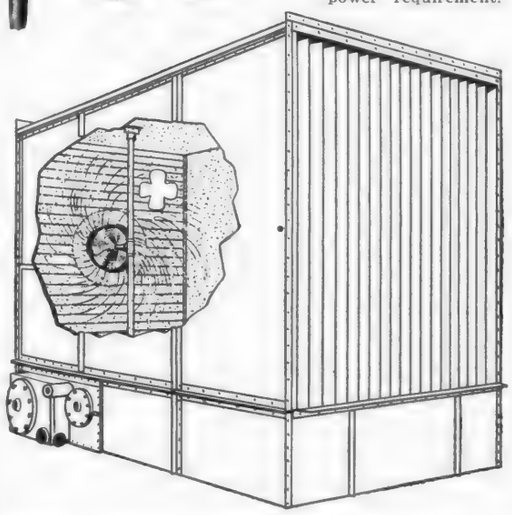
— a dense mist screen obtained by directing the water from the single nozzle to a rapidly revolving rotor where it is churned centrifugally into an even, solid spray.

— 40 to 60% power requirement of multiple nozzle system because only 7 lbs. per square inch pressure is needed at the nozzle.

— by replacing multiple nozzle banks with Bayley Turbo-Atomizers present inefficient installations of air washers can be made highly efficient.



The Bayley Turbo-Atomizer and below the complete Bayley Turbo Air Washer. Non clogging and operating with nominal water pressure at low power requirement.



That briefly is the Bayley concept of an efficient air washer and the manner in which the Bayley Turbo-Air-Washer is built and operates. Scores of installations have proven it successful. May we tell you where they are and state the argument more fully by means of Bulletin No. 25?

BAYLEY BLOWER COMPANY
742 Greenbush St., Milwaukee, Wis.

Bayley

AIR ENGINEERING & EQUIPMENT

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS — PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

Month after month home and prospective homeowners read about the Caloroil Line of Oil Burners thru magazines, newspapers, billboards and direct by mail advertising.

Different

OIL BURNER BUYERS

Make differing

MARKETS

PEOPLE with small incomes, people with large! People with cottages, people with mansions! People buying for comfort, for economy, for silence—or buying frankly on price.

Each class demands a different burner. Each *will buy* a different burner.

Caloroil Dealers, with a *line of various types* of oil burners, reach the *whole* market. Each burner added to the Caloroil line has established a record—in service—of correctness in principle and design, and also a record of salability.

The Caloroil *line,* appealing to the entire oil burner market, is extensively and aggressively advertised. It not only fills a demand that now exists—but by advertising is intensifying that demand. Your customers are learning that they do not have to "fit the house to the burner," because *in the Caloroil line,* they can get a burner that "fits the house."

If you want the facts, write. We will gladly lay the details of this plan before you.

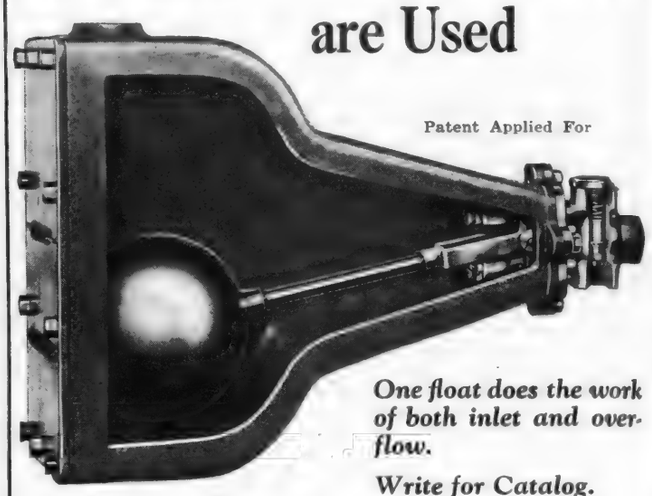
Caloroil

BURNER CORPORATION

225 West 34th Street, New York City

260 Tremont Street, Boston

Heating Boiler Protection is Assured when Thermoflex Feeders are Used



Patent Applied For

One float does the work of both inlet and overflow.

Write for Catalog.

W. D. CASHIN COMPANY

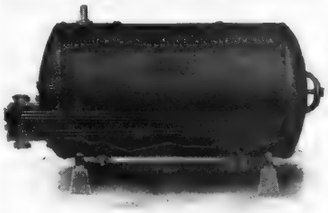
35 HARTFORD ST. BOSTON, MASS.

Distributers in

New York, Chicago, Philadelphia, Syracuse, Cleveland, Detroit, Charlotte, Washington, Hartford, Conn., San Francisco, Minneapolis, Pittsburgh, St. Louis

Alberger Buffalo Heaters

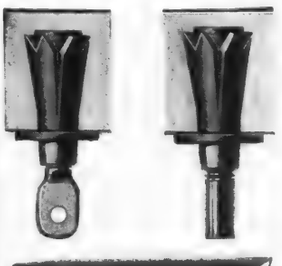
are built for a great variety of standard and special operating conditions for heating water with steam or for the interchange of heat from one liquid to another.



Instantaneous Heaters
Storage Heaters
Swimming Pool Heaters
Economizers
Coolers
Heat Interchangers

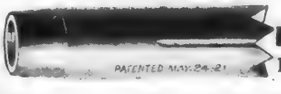
ALBERGER HEATER CO. 285 Chicago St.
HOWARD IRON WORKS Buffalo, N. Y.

PHILLIPS Self-Drilling Expansion Shells



For use in ceilings, walls, floors and beams for fastening pipe hangers, etc., and bolting timber and other equipment to concrete and stone.

Quickly installed with the PHILLIPS SPRING HAMMER or by hand. No drills required. Every shell makes its own hole.



Phillips Drill Company
1537 Cortland St., Chicago

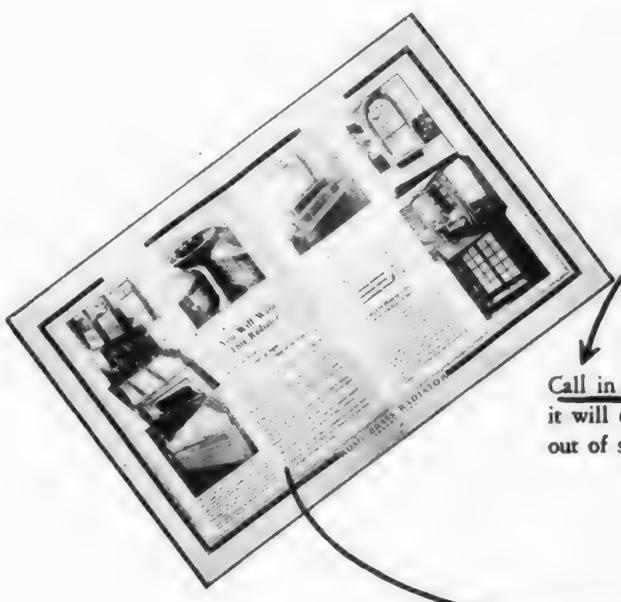
ROBRAS 20-20

"Call In YOUR Local Steam Fitter" *We Say to FIFTY THOUSAND of Your Prospects*

YOUR interest in the mailer below probably centers on the directions to the fifty thousand, to whom it is to be mailed, to ask you about Robras 20-20 radiators. Not only in this, but in most other mailing pieces, and in advertisements directed to almost half a million home builders or owners, we say, "go to your steam fitter, he can show you how to replace your old-fashioned radiators with the in-the-wall, out-of-the-way, out-of-sight Robras 20-20 Radiators."

The quality-price and discounts, make installing Robras 20-20 Radiators extremely profitable to you.

Why not send for all the literature on these radiators? Why not order one in a popular size to show prospects who want explained how a radiator one-fifth the size can give heat equal to an old-fashioned cast iron radiator?

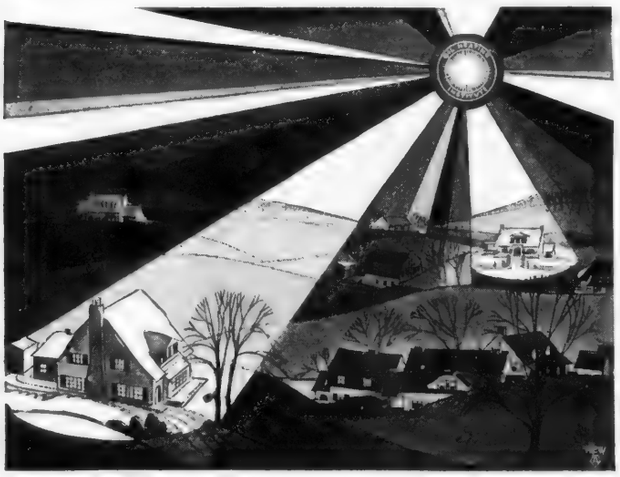


Call in your local steam fitter or plumber and see how little it will cost to have ROBRAS 20-20 Radiators in your walls, out of sight, and out of the way.

ROME BRASS RADIATOR
CORPORATION

ONE EAST FORTY-SECOND STREET :·: :·: NEW YORK CITY

OIL HEAT—AS BENEVOLENT AS SUNSHINE



Are You Getting *Your Share* Of This Business?

THAT there is money to be made in the sale and installation of oil heating equipment is obvious to all.

The fact is often lost sight of, however, that the sale of oil burners is only part of the profit-making possibilities of this business.

Defective piping, lack of radiation, improper air ducts —all these have a vital bearing on the service rendered by an oil burner.

The extent to which you capitalize upon this business depends largely upon the reputation you have established as an authority on oil burners.

The Oil Heating Institute is operated not alone to acquaint the public with the advantages of oil heating, but to enable you to safeguard and promote your reputation. To the extent that you utilize its services will the good will of your business be increased.

These services include among other things the publication of a series of booklets on oil heat, written by national authorities, which are available to you without cost. The coupon will bring the book in which you are most interested.

This is the Emblem of the *Oil Heating Institute*

It is the symbol of satisfactory public service in oil heating.

Only the manufacturers who are members of the Oil Heating Institute are permitted to use it.

These manufacturers have earned their membership through the enthusiasm of thousands of home owners whom they have provided with efficient and dependable oil heat.

This emblem protects you, and it will be protected, on your behalf, by the Oil Heating Institute.

The Oil Heating Institute is prepared to furnish special information on the heating of churches, theatres, hotels, apartment houses and office buildings, and on the various heat treating processes of industry.

OIL HEATING INSTITUTE

420 Madison Avenue New York

Check the book you want

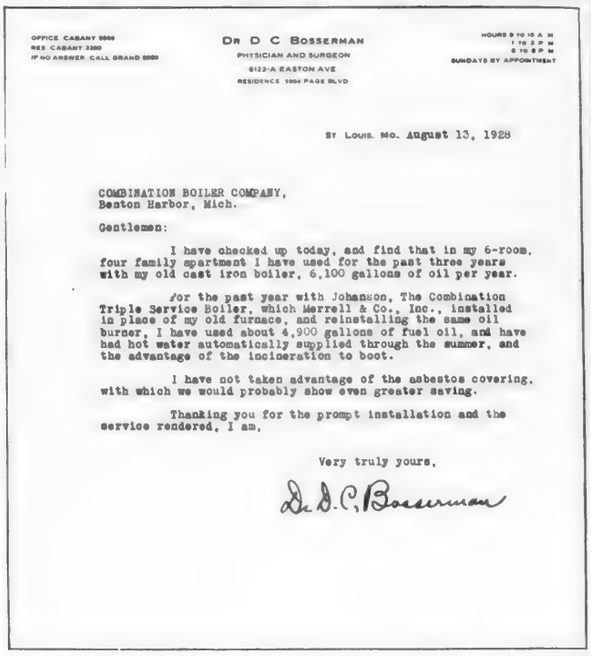
MAIL THE COUPON TODAY!

OIL HEATING INSTITUTE H&V-10
420 Madison Ave., New York City

Please send me, free of charge, the following information on oil heating equipment:

Does it Pay to Install an Oil Heater?.....
Are Oil Heaters Perfected?
What About the Supply of Oil Fuel?.....
Making Better Use of the Basement.....

Name .....
Address .....
City ..... State .....



OFFICE CABANY 0000
RES. CABANY 3380
IF NO ANSWER CALL GRAND 0000

DR D C BOSSERMAN
PHYSICIAN AND SURGEON
6123-A EASTON AVE
RESIDENCE 1004 PAGE BLVD

HOURS 9 TO 10 A M
1 TO 3 P M
6 TO 8 P M
SUNDAYS BY APPOINTMENT

St Louis, Mo. August 13, 1928

COMBINATION BOILER COMPANY,
Benton Harbor, Mich.

Gentlemen:

I have checked up today, and find that in my 6-room, four family apartment I have used for the past three years with my old cast iron boiler, 6,100 gallons of oil per year.

For the past year with Johanson, The Combination Triple Service Boiler, which Merrell & Co., Inc., installed in place of my old furnace, and reinstalling the same oil burner, I have used about 4,900 gallons of fuel oil, and have had hot water automatically supplied through the summer, and the advantage of the incineration to boot.

I have not taken advantage of the asbestos covering, with which we would probably show even greater saving.

Thanking you for the prompt installation and the service rendered, I am,

Very truly yours,

Dr. D. C. Bosserman

Economy — Added Service — Satisfaction!

Besides burning 6100 gallons of oil in heating building, Dr. Bosserman was spending from $170.00 to $200.00 per year for gas to heat domestic hot water for his tenants during the warm months.

With the same oil burner, the Combination Triple Service Boiler (Johanson Patent) now heats his building and furnishes year 'round domestic hot water automatically with 4900 gallons of oil per year, eliminating the expenditure for gas entirely.

A saving of 1200 gallons of oil plus $170.00 or more for gas per year with "the advantage of incineration to boot"!

If results such as this mean anything to you, send today for interesting pamphlet giving full particulars.

Agency proposition, catalogue, prices, etc., also sent on request.

Ask for a copy of a recent test given this boiler by unbiased engineers. It will surprise you agreeably.

COMBINATION BOILER COMPANY

BENTON HARBOR, MICH.

TRIPLE SERVICE COMBINATION BOILERS — COMBINATION TRIPLE SERVICE BOILERS

Modern Buildings Need this Modern Radiator

Typical of the fine buildings installing modern McQuay Radiators, is this New York City Apartment at 201 East 35th Street.

Gronenberg & Leuchtag, Architects.
Barron-Hubert Co., Heating Contractors.

Its Beauty Attracts Tenants It Cuts Operating Costs

Complete circulation of the heated air—so essential to economical heating—is provided by the McQuay Cabinet Radiator (a complete radiator, not just a cover). For, heated air is impelled out into the room with *sufficient velocity to distribute it evenly throughout.* A humidifying pan, inside the cabinet, provides the moisture needed for healthy, effective heating.

A Complete Radiator

McQUAY *Cabinet* **RADIATOR**

Not Just a Cover

Actually, because of the adequate circulation, and the greater heating effectiveness of moistened air —*the temperature of a McQuay may be kept many degrees below* that of old-style radiators. The fuel saving is considerable.

Because of their light weight McQuay Radiators are easily installed. And they are designed to rough-in more nearly with Standard Specifications of steamfitters' code. Ask for catalogs of the complete McQuay line. They're compiled to be easily understood.

Also: Concealed Radiators and Unit Heaters to meet any contingency

McQUAY RADIATOR CORPORATION

General Sales Office: Pure Oil Bldg., Chicago

New York: 2148 Graybar Bldg. Boston: 164 Federal St.
Newark, N. J.: J. F. McLaughlin Co., 738 Broad St.
Cleveland: 291 E. 149th St.

201 East 35th Street
New York City

Profit Insurance

For

$7.50

Insure your profit. Installing the Preferred Anti-Syphon Valve in oil burning systems is the safe, sure and profitable policy for you. It ends the expense for deep burying of tanks.

It is positive protection against oily, flooded cellars.

The Preferred Anti-Syphon Valve is approved by the Underwriters' Laboratories.

It is of simple and sturdy construction. It has no springs or adjustments to go out of order. It is made of valve bronze.

The Preferred Anti-Syphon Valve is positive in action, very easy to install, reliable in performance and low in price.

The list price is only $7.50.

Write for literature and discounts.

Preferred Utilities:

PREFERRED 100% AUTOMATIC DAMPER
PREFERRED FOOT VALVES
PREFERRED ANTI-SYPHON VALVES
PREFERRED DOUBLE TAPPED BUSHINGS
PREFERRED FLUSH BOXES
PREFERRED VENT PROTECTORS

Other Preferred Utilities are in our laboratory and on test in the field.

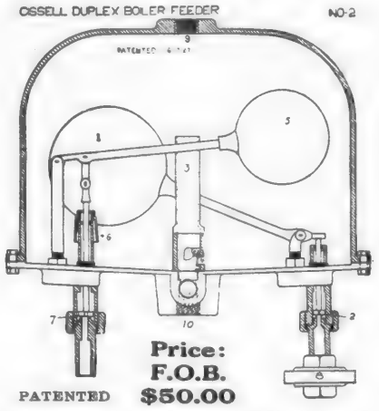
Exclusive Distributors for Absolute Con-Tac-Tor Corp. and King-Seeley Corp., in New England, New York and Northern New Jersey. Complete stock carried in New York City.

PREFERRED UTILITIES MANUFACTURING CORP.
33 West 60th St., New York, N. Y.

Now is the Time

For Real Boiler Protection

While Also Increasing Its Efficiency



Price: F.O.B. $50.00

PATENTED

This Duplex feeder, built especially to meet conditions existing in heating boilers, will make your boiler absolutely automatic, eliminating danger of burning boiler or cracking sections. In selecting a boiler feeder you want the best; thousands of these feeders are in use and never a complaint. So sure are we as to its efficiency, that we sell it with an ABSOLUTE GUARANTEE.

Write for Full Particulars and Discount

Manufactured by

W. M. CISSELL MFG. CO., INC.
111 South Second Street LOUISVILLE, KY.

H.T.P.

HEAT TRANSFER PRODUCTS

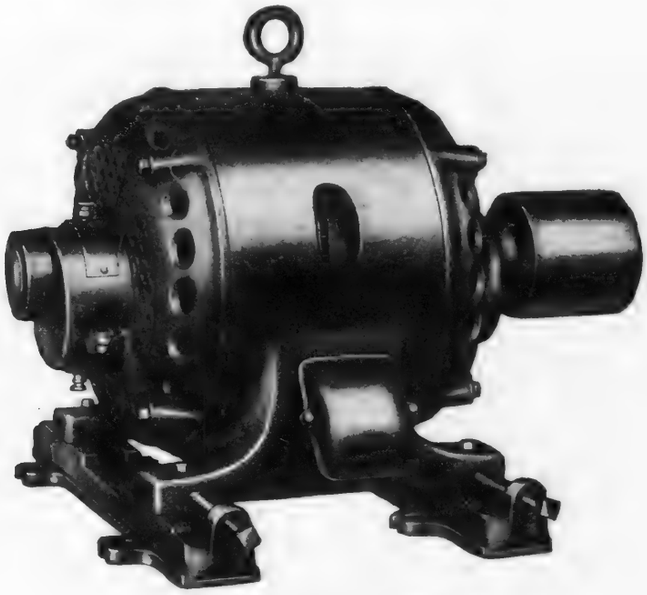
Designers and builders of general engineering equipment for

Power Plants
Chemical Plants
Oil Refineries
Gas Plants
Textile Mills
Refrigeration Plants
Air Conditioning
Laundries
Heating & Ventilating
Paper Mills, etc.

Also equipment for severe duty such as high pressures, high temperatures and unusual corrosive conditions . . .

Complete engineering service furnished on any problem in these industries.

HEAT TRANSFER PRODUCTS, INC.
A Division of the
Staten Island Shipbuilding Company
90 West Street, New York, N.Y.



10 Horse Power Century Type SC
Squirrel Cage Induction 3 and 2 Phase Motor

Long Life Stators

Dampness does not affect the field coils of Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors....The windings are thoroughly insulated in the slots and particularly between phases, and are then saturated with insulating varnish....Open construction of coil ends allows free circulation of air through and around them—this helps hold the temperature rise well within safe limits. Combined with liberal proportions, and proper mechanical and electrical design and allocation of active materials, this results in long life stators.

Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors are built in all standard sizes from ¼ to 200 horsepower

CENTURY ELECTRIC COMPANY
1806 Pine St. St. Louis, Mo.
35 Stock Points in the United States and more than 50 outside thereof

Century MOTORS

"THEY KEEP A-RUNNING"

BRYAN BOILERS

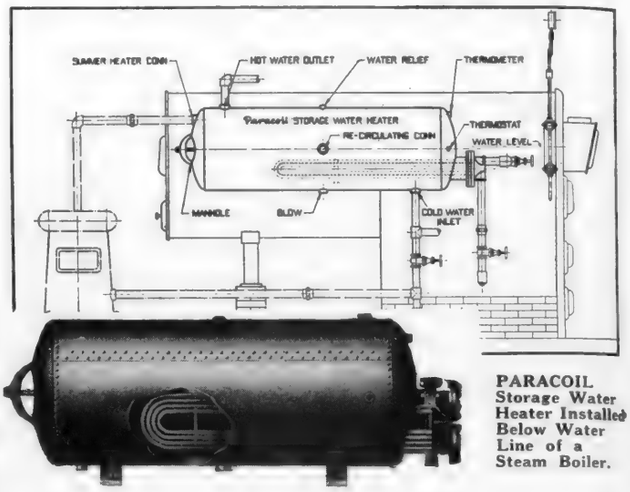
Oil Gas

Bryan Boilers are built for a purpose and marketed to meet an imperative demand. Several manufacturers had perfected their Oil-Burning devices to such an extent that they consumed the fuel with a minimum amount of waste and a maximum amount of heat. But how to convey this heat to the radiators in an economical manner? That was an unanswered question until the advent of BRYAN BOILERS.

BRYAN accomplished this feat by building a boiler that employs principles which are entirely different from those used in constructing coal-burning boilers.

Here are a few of the reasons for BRYAN success .... a combustion chamber which eliminates "stack loss" .... a tube arrangement which assures rapid circulation and which eliminates heating the basement .... scientific construction throughout which meets the requirements for oil and gas burning.

BRYAN STEAM CORP.
(BOILER DIVISION)
PERU INDIANA



PARACOIL Storage Water Heater Installed Below Water Line of a Steam Boiler.

Hot Water for Large Buildings —the indirect way

There is a marked tendency on the part of heating engineers and architects to specify the use of indirect water heaters in large buildings.

In these large installations the principle of the indirect heater may be utilized to better advantages in the Paracoil Storage Water Heater arranged for installation *below the water line.* Many striking advantages over other systems will result as noted in the list below.

Note These Advantages

- Fuel Saved
- Safety in Operation Increased
- Noiseless in Operation
- Water Hammer Eliminated
- Head Room Saved
- Requires Less Piping— Costs Less
- Automatic Regulation Of Water Temperature
- Can Be Cleaned Without Shutting Down The Boiler Plant

Ordinary steam tube storage water heaters are not suited to below water line service. Special care in designing the length and number of copper tubes to assure the proper heat transfer is necessary. Paracoil Storage Water Heaters are designed with this important point paramount.

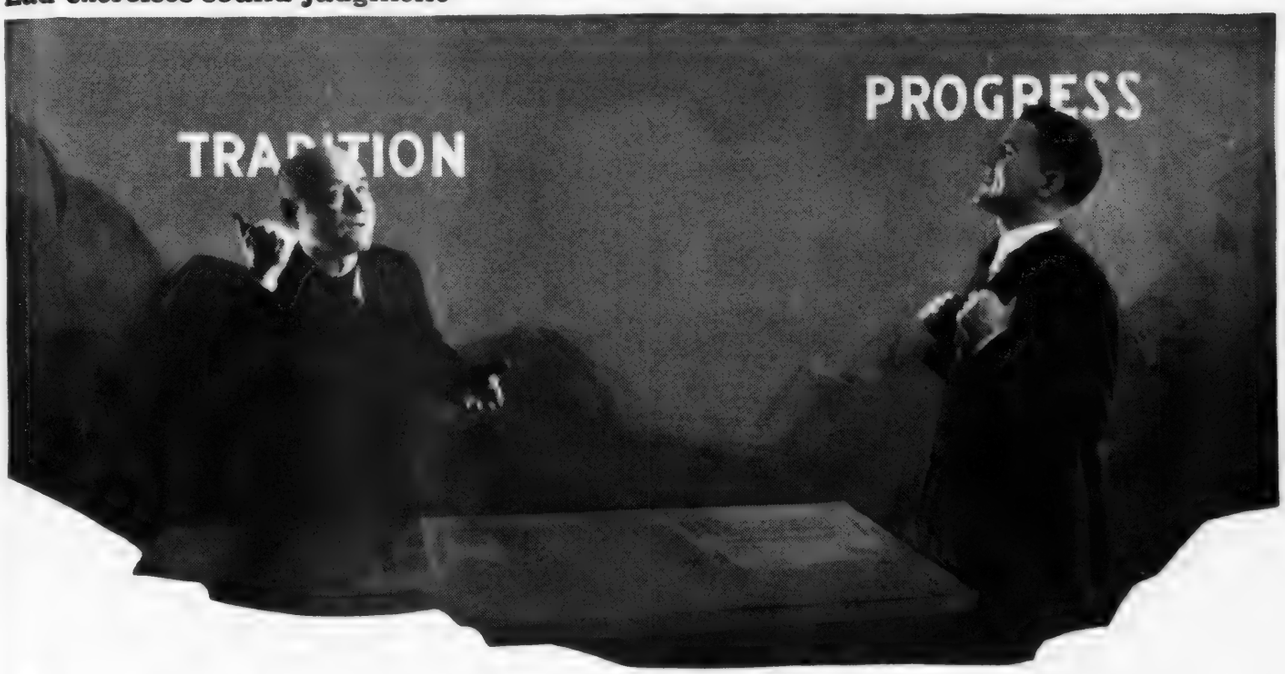
Paracoil Storage Water Heaters are used in many prominent buildings. They are fully guaranteed both as to construction and performance.

Write for booklet "Hot Water for Large Buildings," fully illustrated with diagrams and color chart.

DAVIS ENGINEERING CORP.
90 West St., New York City
Factory: Elizabeth, N. J.

Paracoil
Storage Water Heaters

Lad exercises sound judgment



"Here, Lad—

my buddie from whom I've been buying motors was just in. He tells me that you've been saying that his motors require a higher maintenance cost than the 'Linc-Weld' motor, and he's greatly exercised over it."

"Linc-Weld" Superiority is due to:

1. **Larger Shafts**
2. **Larger Bearings**
3. **Better Insulation**
4. **Stronger Frame (Steel)**
5. **Greater Overload Capacity**

"Yes, Pop—

and our motor maintenance department is greatly OVER-exercised *because they do.*

Why don't you exercise your powers of observation and take your daily exercise walking through a few plants around here that have taken on the 'Linc-Weld' motor, also *because they do.*

Let me tell you now that the way the 'Linc-Weld' tears into a job without wilting is what is chasing people to the 'Linc-Weld' for their heavy work.

The 'Linc-Weld' motor with its three individual features:

(a) Greatest ventilation
(b) Biggest bearings and shafts
(c) Best insulation

is what is spoiling your buddie's party.

And let me tell you that he used the wrong word when he said he was *exercised.*

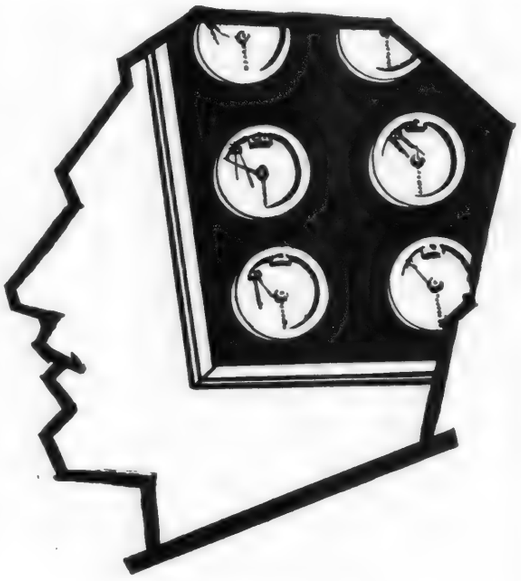
That's no name for it—it's got him ON THE RUN."

The Lincoln Electric Co., Dept. No. 16-10, Cleveland, Ohio

M-25

"Linc-Weld"

LINCOLN MOTOR



THE BRAINS

of a Modern Heating Plant is the Instrument Board

THE day for overheated or underheated office buildings, hotels, apartment houses and stores is rapidly passing. Owners have found that it isn't good business either to waste heat or to save it when it is needed.

To maintain a heating plant at the highest degree of efficiency and economy, Recording Instruments are necessary. Today's records must govern tomorrow's results.

Foxboro Instruments find many applications in a modern heating plant. They are sold with a definite guarantee to do the work for which they are designed. Address our nearest branch and our data relating to any temperature, flow, humidity or pressure problem you may have will be made available.

Foxboro Guarantee sealed to each Controlling and Recording Instrument.

THE FOXBORO COMPANY
Neponset Avenue, Foxboro, Mass., U.S.A.

New York Chicago Philadelphia Boston Pittsburgh
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San Francisco Dallas Los Angeles Portland, Ore.

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

HARTMANN
RADIATOR BRACKETS

THREE STYLES
AR NR NV

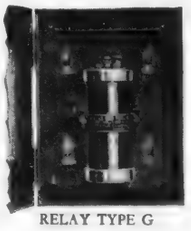
Write for Descriptive Circular and Price List
CHARLES HARTMANN CO.
975-993 Dean Street BROOKLYN, N. Y.

—a line of controls you'll be proud to represent

Teeple Controls meet every problem of heat control for gas furnaces and boilers; unit heaters; refrigerating plants; ovens; furnaces; and automatic coal and oil burners. Accuracy and reliability are built into every instrument manufactured. You can recommend Teeple Controls to your customers.

CLOCK THERMOSTAT

Write for this new Catalog....
Our latest catalog fully illustrates and describes the full line of Teeple Controls. Gladly sent.

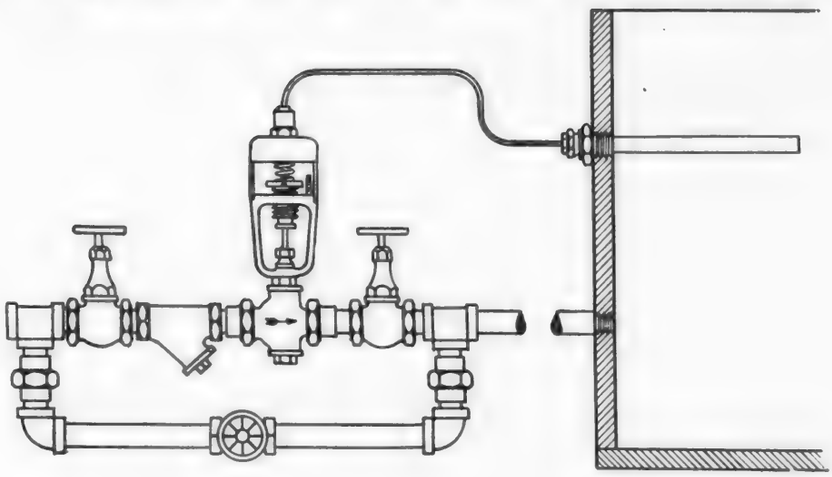


RELAY TYPE G

L. R. TEEPLE CO.
540 E. 9th St., Portland, Oregon

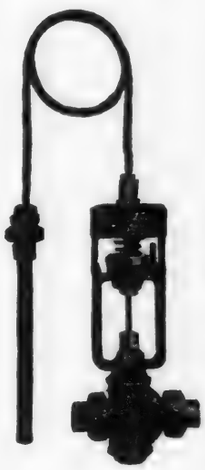
TEEPLE
TEMPERATURE
TEEPLE *Controls*
for GAS — STEAM — WATER — AIR

Temperature Control



For Water Heaters and Storage Tanks

Precision regulation pays. If the temperature is to be controlled at all, then the closer the better. The American Precision Temperature Controller maintains a uniform temperature all the time. There is never any variation. It will regulate to within 1° F. plus or minus. Compare its accuracy.



The heart of a temperature controller is the bellows. The bellows in the American Precision Controller will expand and contract 60 million times before rupturing. That's what gives it long life. Compare its durability.

Test one yourself—without obligation. You will not be expected to keep it unless you're completely satisfied.

Send for Folder R-14

AMERICAN INSTRUMENTS

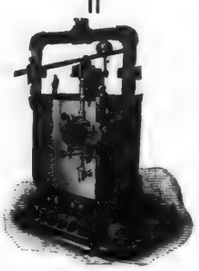
SINCE 1851

CONSOLIDATED ASHCROFT HANCOCK CO. INC.
AMERICAN SCHAEFFER & BUDENBERG DIVISION

338 Berry Street Brooklyn. N.Y.

Branches in Principal Cities

October Gales *make* Peerless Sales



OCTOBER is a good month for selling PEERLESS Boilers. When the frost is on the pumpkin, the winter coming after is on the home owner's mind.

Right now is a good time to get down to real facts on gas heating with your prospective customers. The great strides that have been made are as nothing compared with the selling records just ahead. Widespread gas heating is not "around the corner." It is in plain sight.

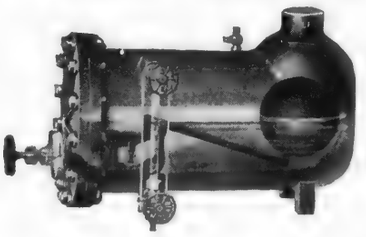
And remember that to sell a PEERLESS means a new booster for gas heating who will sell others for you. Hit hard. Now is the time. And PEERLESS—the Super Section Boiler that assures the supreme satisfaction to be had from heating with gas—will be a great ally.

MILLIONS of gallons of water are being heated by coal where gas would be better. Hotels, apartment houses, clubs, hospitals, schools, office buildings and factories present tremendous possibilities both in replacement and in new water heating installations.

Tap this rich field with PEERLESS Gas-fired Hot Water Storage Systems.

THE PEERLESS HEATER COMPANY
BOYERTOWN, PENNA.

For greater capacity—



DAVIS STEAM TRAPS

THE duplex valves and continuous flow give this Davis Steam Trap the unusually large reserve capacity that has won its wide application for draining dry kiln coils, steam and oil separators, cooking kettles and wherever there is a big volume of condensate but subject to great variation.

Two balanced float valves, frictionless in operation, facilitate and automatically regulate the flow. The water level never drops below the valve openings—steam can never escape. Catalog showing details of construction and design will tell you why so many plant engineers are specifying Davis Valve Specialties.

G. M. Davis Regulator Company
436 Milwaukee Avenue, Chicago, Ill.

Automatic Valve makers for over fifty years.

DAVIS VALVE SPECIALTIES

H&V10-Gray

New Home Study Course in Gravity Steam and Water Heating

The New Home Study Course in Gravity Steam and Water Heating which has been one of the most popular features in THE HEATING AND VENTILATING MAGAZINE during the past two years is now ready in loose-leaf form (without instruction features) for the astonishing low price of

$10.00

Never before offered in reprinted form except to purchasers of the correspondence course which sells for $120.00. Send for full details.

HEATING & VENTILATING MAGAZINE CO.
386 Fourth Avenue NEW YORK

CONTROL THE SPEED
OF YOUR VENTILATING EQUIPMENT!
REGULATE WARM AND COLD AIR VOLUME

WITH THE TIME TESTED

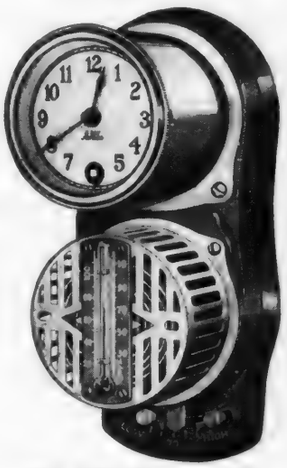
HORTON
VARIABLE SPEED
PULLEY

HORTON MANUFACTURING COMPANY
3008-3016 University Avenue S.E. Minneapolis, Minn.

MINNEAPOLIS REFERENCES
Morgan-Gerrish Co. Richardson-Boynton Co. Vroman Cook Co.
American Foundry & Furnace Co., St. Paul

Clock Advantages
High Voltage Advantages
Mercury Switch Advantages
—*in Room Temperature Control*

The announcement of Con-Tac-Tor's new No. 136 Clock Thermoswitch a short time ago gave to the automatic heating industry a new instrument which combines the benefits of clock cycling with the simplicity and dependability of mercury switching for high or low voltage. Its operating differential is but one degree, and in conjunction with the new No. 112 Relayswitch it is capable of controlling loads up to one horsepower.



No. 136 Thermoswitch

No. 112 Relayswitch

Write for Bulletin

If you have not received a copy of the new Con-Tac-Tor Bulletin covering your phase of the heating industry, send for it at once. You will find listed all the very latest developments in control instruments and systems—all incorporating the simplicity and dependability of mercury switching. Bulletin 111 covers Oil Burners, Bulletin 131 is for Coal Blowers, and Bulletin 141 describes Unit Heater controls.

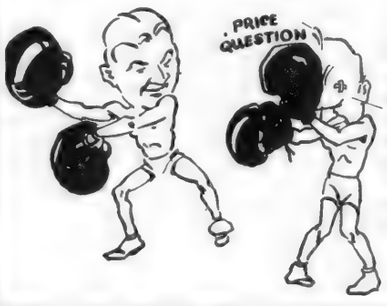
ABSOLUTE CON-TAC-TOR CORPORATION

ELKHART INDIANA

The Johnston Oil-Burner-Boiler Knocks Out The High Cost Objection

After the prospect has been all warmed up to the advantages of automatic heat, isn't it what Sherman said war is, to have him say—"... but, of course, it takes too much fuel, it is too expensive to operate"—? You can knock this objection out in a hurry if you handle the Johnston-Oil-Burner-Boiler. You can show where the combination of your burner and the Johnston boiler will save from 25 to 50 percent on fuel costs year in and year out. Better write for the Johnston Catalogue and dealer proposition right away—it will pay you well.

JOHNSTON BROTHERS, Inc.
FERRYSBURG, MICHIGAN



The Johnston Oil-Burner-Boiler packs a big punch. It knocks out the price question and helps you get more names on the dotted line. Just mail the handy coupon and we'll send the whole story by return mail.

JOHNSTON BROS., INC.
Ferrysburg, Michigan.

Gentlemen:

Tell us how the Johnston Oil-Burner-Boiler will help us knock out the price question, and sell more oil burners.

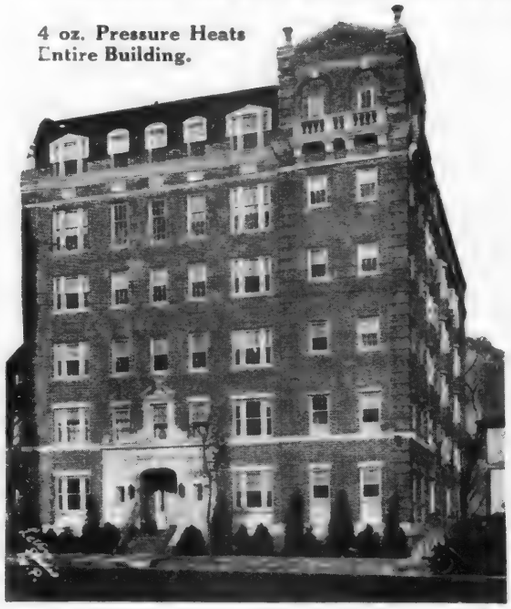
Name .....

Address .....

City ..... State .....

Another Apartment heated by the GORTON SINGLE PIPE VAPOR SYSTEM

4 oz. Pressure Heats Entire Building.

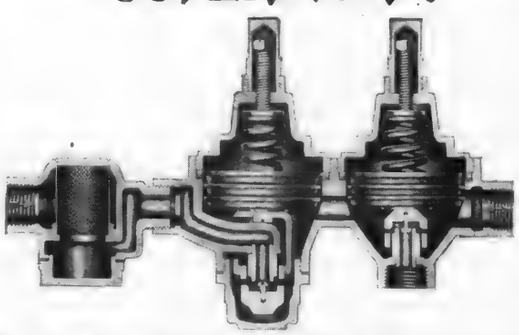


CHAPMAN APARTMENTS, New Rochelle, N. Y.
Laurence M. Loeb, *Architect.* Robert Mullins, *Heating Contr.*

Catalogue and Trade Price Sheet gladly sent.

GORTON HEATING CORPORATION
Formerly Gorton & Lidgerwood Co.
Est'd 1887 96 Liberty Street, New York, N. Y.

The KAINER PRESSURE GOVERNOR



For Hot Water Heating Systems—Eliminates Tank and Fittings

Rust-proof—scale proof. Permits full flow of water without any restriction—no water hammer.

Valve body construction entirely of bronze. Removable seats. Adjustment screws concealed beneath removable bonnets.

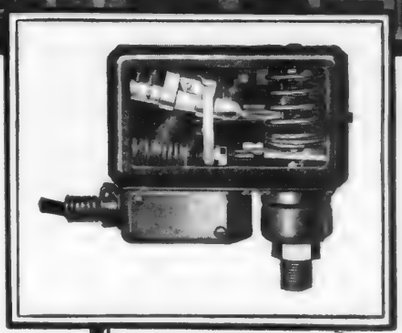
Guaranteed Satisfaction

Write us at once for our dealer proposition

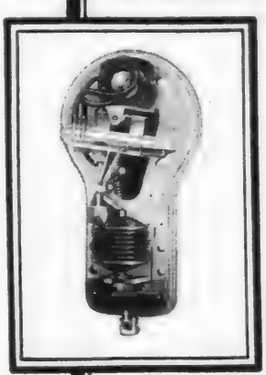
KAINER & COMPANY
CHICAGO

761-763 Mather Street
Manufacturers of
Plumbing and Heating Specialties

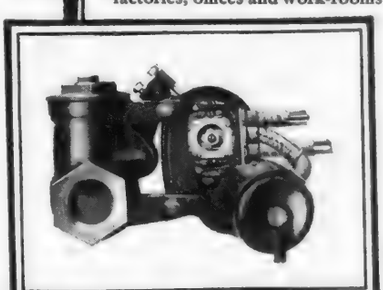
B. & O. Perishable Products Buildings, Philadelphia, Pa. Heating Contractor, Baltimore Heat Corporation, Baltimore, Md.



Mercoid Control No. 848—one of many models in a complete line. Can be used to accurately control temperature from 30° to 600° F. and pressure from vacuum to 2500 lbs.



Mercoid Thermostat No. 845—room temperature type for accurate control of temperature in factories, offices and work-rooms.



Arco Motor Valve No. 847—to control the flow of high or low pressure steam, oil, gas, water, brine, etc.

These

Baltimore & Ohio R.R. Buildings

are equipped with

MERCOID Controls

THESE two new and extremely modern buildings are heated with forty-four Unit Heaters, all of which are under control of Mercoid Thermostats and Arco Motor Valves. And the hook-up is such that the Mercoid not only starts and stops the fan motors but also operates the Arco motor valves which control steam supply.

This type of installation and many others throughout the country offer convincing evidence of Mercoid success. Everywhere heating engineers are using Mercoid Controls in a wide variety of heating applications. Wherever the problem is the control of temperature, pressure or vacuum, there Mercoid will do its work automatically, accurately and dependably.

If you are not familiar with the complete line of Mercoid Controls, Thermostats and Motor Valves write today for free literature that fully describes this remarkable line of instruments.

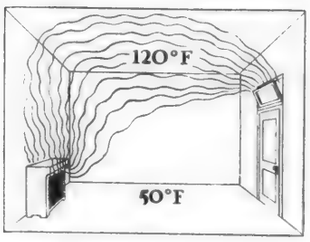
AMERICAN RADIATOR COMPANY

Accessories Div. M-710, 40 West 40th Street, New York, N. Y.

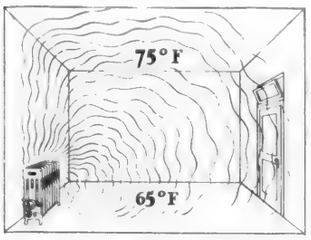
But Who Lives on the Ceiling?

Too Often Heat Just Slides Along

Then Exits by the Ceiling



Straight up—then out the first exit—that's the action of heated air from high temperature units—and it means high cost.



Distributed evenly throughout the entire room—that's heat from Clow Gasteam Radiators—and it means low cost.

THE top illustration here shows how heated air travels from the usual high temperature heating unit—(heating air to temperatures as high as 300° F. as it leaves the appliance, because of inadequate heating surface.)

From it, the heated air rushes *up*—mostly *above* the living area of the room—then stratifies along the ceiling—usually ducking out at the nearest opening.

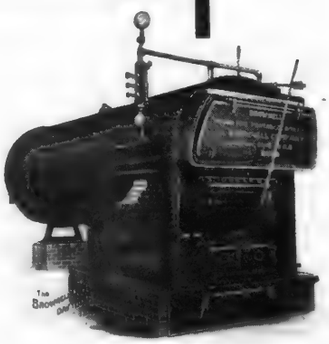
Not so with Clow Gasteam Radiators. Because their large low temperature heating surfaces are never hotter than low pressure steam, they distribute heat evenly throughout the room. And this heat warms the "living" section of the room as quickly as the ceiling.

Clow Gasteam Radiators are made of cast iron. They are built for long service. They are not hard to sell. And year by year, they mean satisfied gas users, warmer rooms and lower heating costs.

JAMES B. CLOW & SONS
201-299 North Talman Avenue, Chicago

CLOW GASTEAM

WHY a Boiler by BROWNELL



Return Flue Portable Smokeless Type

Because in a Brownell you will get a heating boiler with 73 years of specialized boiler building experience back of it.

Riveted steel construction of accurately known strength with nothing left to guesswork. Most advanced designs. In fact, everything that it is possible to build into a modern boiler to develop high efficiency with minimum fuel consumption is found in the Brownell.

Brownells comply with ASME and all state codes. Consult nearest Brownell representative. Get Bulletin B6a on boilers and also our stoker bulletin.

BOILERS STOKERS

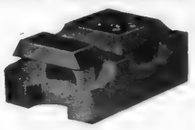
?

The Brownell Co.
Dayton, Ohio

Established 1855

Why Use Large Domestic Coal?

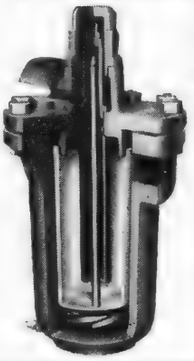
You can obtain the same results at about half the price—with PYRAMID GRATES because they burn Buckwheat Coal.



Let us send you details.

PYRAMID IRON PRODUCTS CO.
230 East 41st St. New York City

Trerice Steam Trap



Revolving valve cleans seat and produces uniform wear on same.

High chrome steel valve and seat. Sent anywhere for free trial.

Some good territory still available. Liberal contracts. Stock sent on consignment.

Write for full particulars to

H. O. TRERICE COMPANY
1338 West Lafayette Blvd.
Detroit, Michigan

ARCO
PACKLESS VALVE
No. 999
For the Modest Home

PACKLESS VALVES are used in practically every big building built today. Why? Because from experience big builders have found packless valves to be the best possible investment.

Why then shouldn't the small home owner always install packless valves? He would if he knew, but he has not had the experience. *You can tell him!*

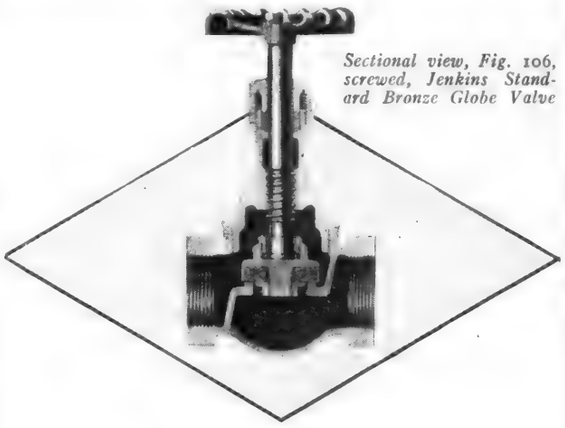
With the new low price of the Arco No. 999 you can now easily sell packless valves for every job—even the very smallest. Think what you have to offer—a valve that never needs repacking—a valve that gives complete protection against leaks that often cause expensive damage to rugs and floors—a valve that opens and closes with one smooth turn of a handle that never gets hot.

For either new jobs or modernizing old ones, Arco Packless Valve No. 999 is an essential part of the most modern heating equipment, whether in lofty skyscraper or modest dwelling—and the first cost, which is also the *last* cost, is but very little higher than the cheapest packed valve made.

Made in angle, corner and globe patterns, wheel or lever handle for steam, water, vapor or vacuum installations.

AMERICAN RADIATOR COMPANY

Accessories Division, Dept. PV710, 40 West 40th Street, New York, N. Y.



Sectional view, Fig. 106, screwed, Jenkins Standard Bronze Globe Valve

A safe job both ways

Fig. 370
Screwed, Jenkins Standard Bronze Gate Valve

Do your customers know valves? If they do, they know Jenkins, recognize Jenkins and appreciate the kind of heating service which Jenkins provides.

Or are they ignorant of valves? In that case, **you** are the one held directly responsible for leaks or frequent repairs.

Fig. 352
Screwed, Jenkins Standard Bronze Swing Check Valve

A Jenkins equipped job is a safe job both ways. The Jenkins "Diamond" mark makes each valve easy of identification to the thousands of owners who know this symbol. And the trouble-free service is a boost for your work.

Fig. 142
Flanged, Jenkins Standard Iron Body Globe Valve

There are Jenkins Valves in bronze and iron, in standard, medium and extra heavy patterns. Obtainable wherever heating supplies are sold.

JENKINS BROS.

80 *White Street.....New York, N. Y.*
524 *Atlantic Avenue....Boston, Mass.*
133 *No. Seventh St., Philadelphia, Pa.*
646 *Washington Blvd.....Chicago, Ill.*

JENKINS BROS., Limited
Montreal, Canada London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

We Want Dealers

Heating Contractors

Do Big Business by Installing our **Baked Enamel Shields** and **Art De Luxe Cabinets,** as every radiator installation means a ready and almost **Certain Prospect** for the **Sale** of our **Shields** or **Cabinets.**

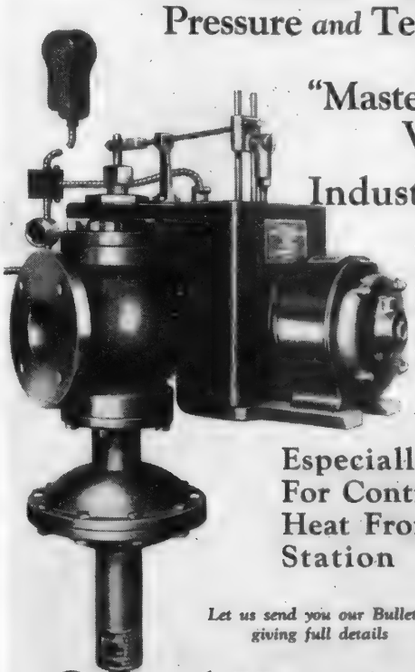
Architects

Continually specify and recommend our **Splendid Line** because **Circulation** is **Not Retarded** on **Account** of our **Construction** which permits of **Ready Circulation** of **Both Cold** and **Hot Air.**

Write for Prices and Dealer Agreement.

ACME RADIATOR SHIELD CO., Inc.
Manufacturers of "Modern" Radiator Furniture
48 and 50 Vine Street **Cincinnati, Ohio**

HORNUNG
Pressure *and* Temperature
2 in 1
"Master Control" Valve
(PATENTED)
Industrial Type



Motor Operated Directly by Thermostat

All Relays Eliminated ... ...

Especially Designed For Control of Steam Heat From a Central Station

Let us send you our Bulletin giving full details

Central Heat Appliances
J. C. HORNUNG, *Engineer*
343 South Dearborn Street Chicago, Illinois
(3475)

You Will Find This Portfolio Helpful

The INSULITE engineering staff, which prepared the portfolio here offered, will be glad to confer with you on any heating problem. The portfolio contains helpful charts and much valuable data.

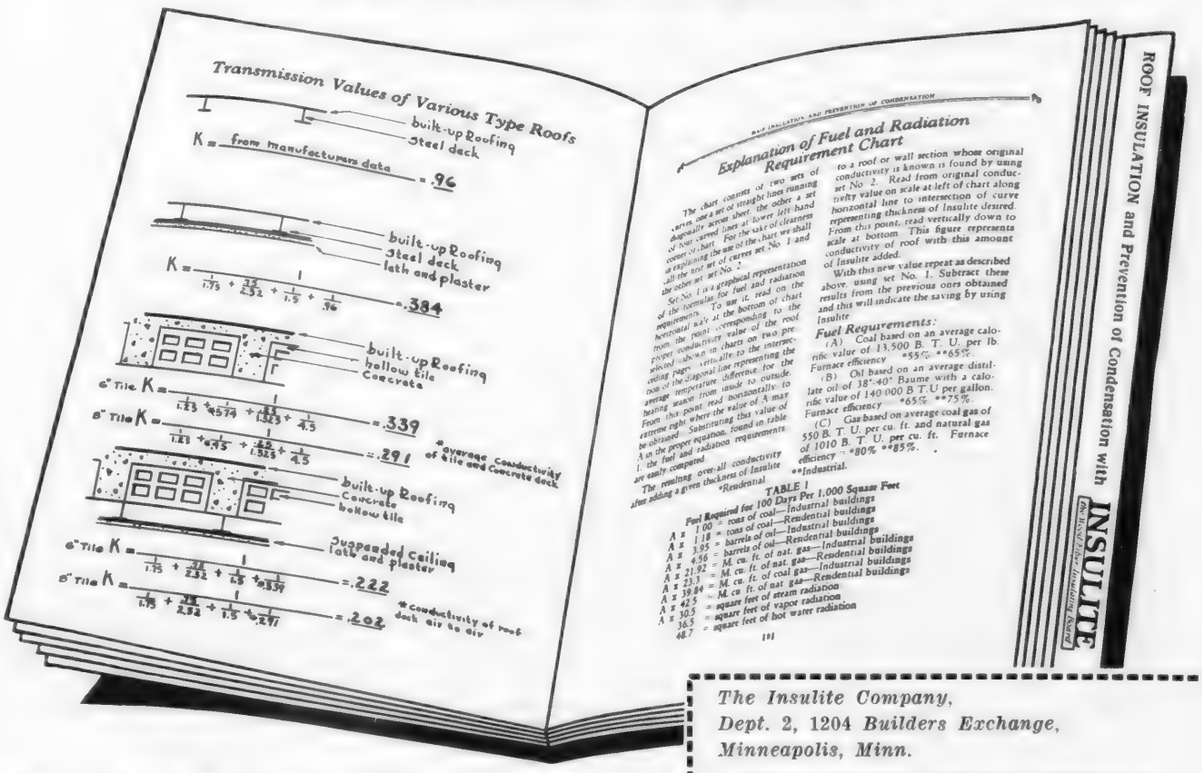
Proper insulation and the prevention of moisture condensation are just as important as radiation itself in figuring heating jobs.

INSULITE offers the sure, satisfactory solution. For roof insulation it is made in one inch and one-half inch thicknesses. It has great strength, great heat resisting value, is easy to handle and work with. Waste through breakage is eliminated. Moisture and exposure do not injure it.

Write to-day for your copy of the portfolio.

INSULITE

the Wood-Fiber Insulating Board


Transmission Values of Various Type Roofs
built-up Roofing
Steel deck
K = from manufacturers data = .96
built-up Roofing
Steel deck
lath and plaster
K = = .384
built-up Roofing
hollow tile
Concrete
6" Tile K = = .339
6" Tile K = = .291
*average conductivity of tile and Concrete deck
built-up Roofing
Concrete
hollow tile
Suspended Ceiling
lath and plaster
6" Tile K = = .222
6" Tile K = = .202
*conductivity of roof deck air to air
Explanation of Fuel and Radiation Requirement Chart
Fuel Required for 100 Days Per 1,000 Square Feet
ROOF INSULATION and Prevention of Condensation with INSULITE

THE INSULITE COMPANY

Dept. 2, 1204 Builders Exchange

MINNEAPOLIS MINNESOTA

The Insulite Company,
Dept. 2, 1204 Builders Exchange,
Minneapolis, Minn.

Please send your Insulation portfolio to

Name .....

Address .....

City..... *State*.....

Plenty of "Steam" for PROCESS WORK

10-H.P. Type "A" Ofeldt Boiler

with an "Steam in 4 minutes" Ofeldt Gas Steam Boiler

Here's an Automatic, Quick Steaming (only 4 minutes to get up steam) clean-cut, Durable Boiler. It takes up mighty little room, requires no coal or ash shoveling and is always ready for "instant use."

Why run a big coal or oil fired Boiler just to get a little occasional or continuous steam for process work?

"Send for illustrated Catalog"

MEARS-KANE-OFELDT INCORPORATED

Manufacturers of

GAS FIRED BOILERS AND WATER HEATERS

1903-1915 EAST HAGERT STREET PHILADELPHIA

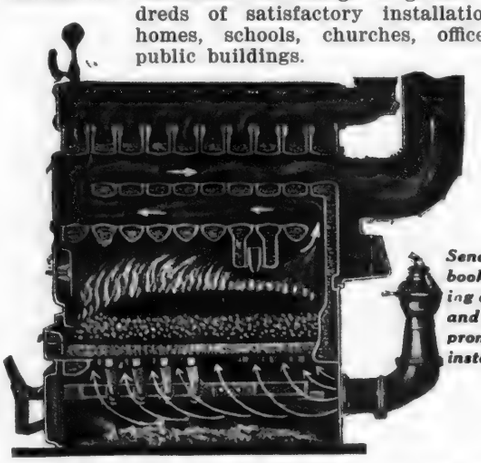
New York—9 Park Place
Boston—100 Arlington St.
Chicago—363 W. Erie St.
Buffalo—Walbridge Bldg.
St. Louis—2010 Locust Blvd.
Los Angeles—940 S. Maple Ave.
Birmingham—American Trust Bldg.

MORE HEAT PER TON OF COAL

WITH THE REGISTERED COPPUS U.S. PAT. OFFICE

UNDER-GRATE DRAFT BLOWER

The COPPUS is a scientifically constructed, coal burning blower designed to burn any grade of coal. Its installation necessitates no change in grates. Hundreds of satisfactory installations in homes, schools, churches, office and public buildings.



Send for booklet, giving details and list of prominent installations

INTERNATIONAL FUEL SERVICE CORP.

Sole Distributors in the United States and Canada

BRIDGEPORT, CONN.

THERMOSTATIC METAL

The most accurate, constant and durable of expansion units

FOR LOW AND HIGH TEMPERATURES

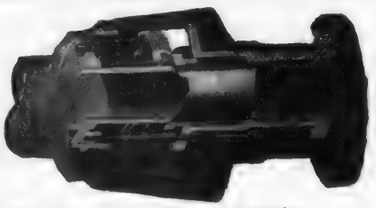
Our No. 1800 metal for temperatures up to 450° F.
Our No. 2800 metal for temperatures up to 1500° F.

Positive and Dependable Thermostatic Metals

W. M. CHACE VALVE COMPANY
1600 Beard Avenue
Detroit, Michigan

ROSS

Crosshead-GUIDED Expansion Joint Excels in



Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

Mr. B. T. U. Says

"BANROC No. 45 UNDERGROUND PIPE INSULATION keeps the heat in this underground steam line and delivers it at the other end with minimum loss."

Plant of Greene-Swift, Limited, London, Ontario... New boiler plant can be seen at left.

Clothing Manufacturer Develops Big Business in District Heating

About fifteen years ago Greene-Swift, Limited, London, Ontario, Canada, decided to utilize their surplus boiler capacity and reduce their own costs for heat and power by selling steam to neighboring buildings.

From a few customers at the beginning, the District Heating business of Greene-Swift, Limited, has grown, until today, the Cities Heating Company, Limited, a subsidiary of Greene-Swift, Limited, is a full-fledged public utility, supplying steam to practically the entire business district of London.

During 1927, ADSCO'S Canadian Subsidiary, the Canadian District Steam Company, Limited, installed an additional four thousand feet of high pressure supply and return lines to the company's system of underground mains.

In hundreds of towns throughout the United States and Canada, other manufacturers have an opportunity that is equal or greater than the one which Greene-Swift have capitalized. *Electric utilities should find food for thought in the achievement of this successful manufacturer.*

Underground steam lines in Multicell Tile Conduit being installed for Greene-Swift, Limited, London, Ontario, by Canadian District Steam Company, Subsidiary of American District Steam Company

CANADIAN DISTRICT STEAM COMPANY, LTD.,
SUBSIDIARY OF
AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

PRINTED IN U.S.A.

BANROC No. 45 UNDERGROUND PIPE INSULATION is used to prevent heat loss in this underground steam line, installed by the Canadian District Steam Company, Ltd., for the Cities Heating Company, Ltd., London, Ontario.

The responsibility connected with the selection of insulating materials for this job are too great to permit of snap judgment. Of prime importance is efficiency—the ability of the insulation to keep the heat in the pipe and deliver it at the other end with minimum loss. And of no less importance is permanence—ability to give a lifetime of service, free from deterioration or disintegration.

If you have an insulating problem, take it up with a BANROC Engineer—there is one near you, ready and willing to work with you for *economical efficiency*.

At the left is reproduced an advertisement published by the Canadian District Steam Company, Ltd., subsidiary of the American District Steam Company, which tells the story of the insulation of underground steam lines for the Cities Heating Company, Ltd., London, Ontario.

Banner Rock Products Co.
Originators of Rock Wool Products
Alexandria, Indiana

MAIL THIS COUPON
to the representative nearest you in any of the following cities:

Boston	Denver	Detroit	Philadelphia
New York	Cleveland	St. Louis	San Francisco
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BANROC INSULATION

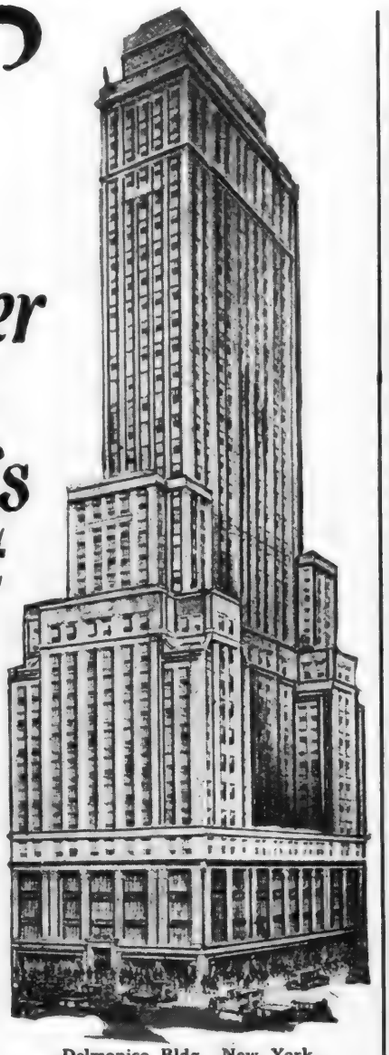
BANNER ROCK PRODUCTS CO.
Send information about BANROC INSULATION

for _____

Name _____

Address _____

Wherever Great Buildings are built Hot Water is usually Supplied by



Delmonico Bldg., New York
H. Craig Severance, Architect
H. Hall Marshall, Engineer
James McCullagh, Inc., Plumbing Contractors

Patterson Hot Water Heaters

One hundred years ago, when Fifth Avenue ended at 13th Street in a trout stream, Ye Old Willow Tree Inn occupied the northwest corner of 44th Street, later the home of the famous Delmonico restaurant and now the site of the 33-story Delmonico Building.

This beautiful building is another of the recent architectural masterpieces in which Patterson Hot Water Heaters have been installed.

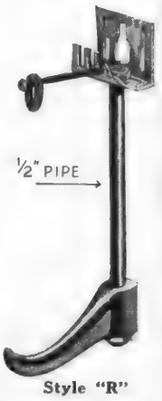
After 48 years of guaranteeing all the hot water required, as hot as required, and when required, it is no wonder that leading architects and engineers specify these hot water heaters for buildings which are worthy of superior equipment.

Catalog and booklet of installations in any type of building sent upon request.

The Patterson-Kelley Co.
107 East 40th St., New York, N. Y.

E-Z

Radiator Hangers



Style "R"

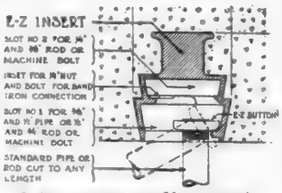
Designed to meet all building conditions and will fit any type of wall construction whether of frame, concrete, brick or hollow tile.

USE THEM ON YOUR NEXT JOB IMMEDIATE SHIPMENT

MADE FOR ALL TYPES OF TUBE RADIATORS

E-Z CONCRETE INSERTS

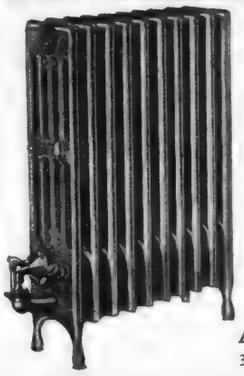
One Size for All Pipe Hangers



ONLY one size needed for all pipe hangers. Ball and socket connection between insert and hanger. Fully adjustable — allows play to overcome expansion and inaccurate alignment of inserts. *E-Z Button turns in the insert—no couplings or turn-buckles needed.* Write for details and prices.

HEALY-RUFF CO.
772 Hampden Ave. St. Paul, Minn.

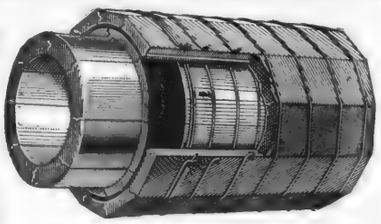
The "Pittsburgh" Automatic Gas Steam Radiator



ECONOMICAL SAFE EFFICIENT SURE
TESTING LABORATORY A.G.A. APPROVED

Mfg. by
Automatic Gas Steam Radiator Co.
303 Brushton Ave. PITTSBURGH, PA.

Wyckoff's Improved Cypress Covering



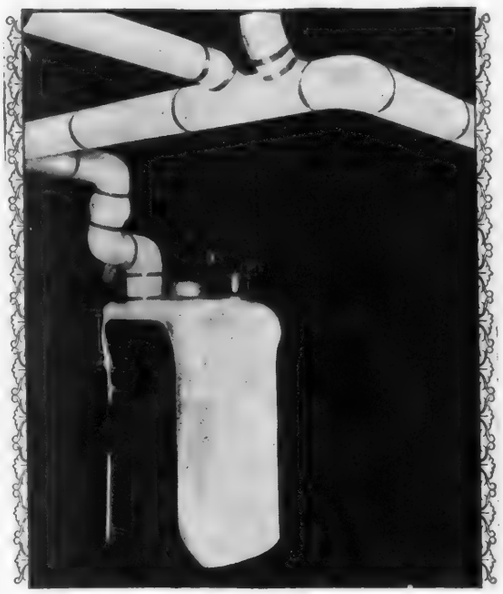
Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

ASBESTOCEL

A NATIONALLY STANDARDIZED INSULATION FOR HEATER PIPES



The choice of insulation for heater pipes is exceedingly important, yet the decision is easily made. Improved Asbestocel is the low-pressure pipe insulation which is nationally sold and which is standard in quality and performance everywhere. When you apply 3-ply Asbestocel you know that the performance and the appearance of the insulation will be the same wherever the building is located, and whatever its size is. There is no other heater pipe insulation which offers you such standardization.

National advertising in general magazines, building papers and other trade papers, keeps Asbestocel before the public. Building committees and individual house owners know the name and will gladly accept your suggestion of Asbestocel.

Asbestocel is a product of Johns-Manville, pioneer workers in Asbestos. It is guaranteed by Johns-Manville to be stronger and more efficient than any of the ordinary air cell insulations.

Because Improved Asbestocel is standard in length and diameter it can be applied more rapidly than the odd lengths and sizes of ordinary air cell. A neat looking job completed more rapidly is the result.

Johns-Manville maintains a large department for the purpose of coöperating with the plumbing and steam-fitting trade on many problems connected with heating houses and buildings of all types. We invite your inquiries, which entail no obligation. Address: Johns-Manville Corporation, Improved Asbestocel Department, 292 Madison Avenue, New York City.

MASTER of ASBESTOS

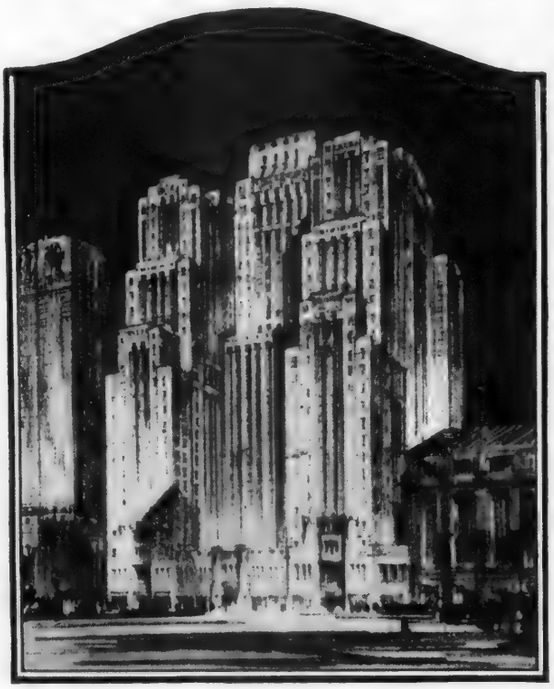
Johns-Manville

IMPROVED ASBESTOCEL

FLAX-LI-NUM CHOSEN

FOR THE WORLD'S LARGEST OFFICE BUILDING

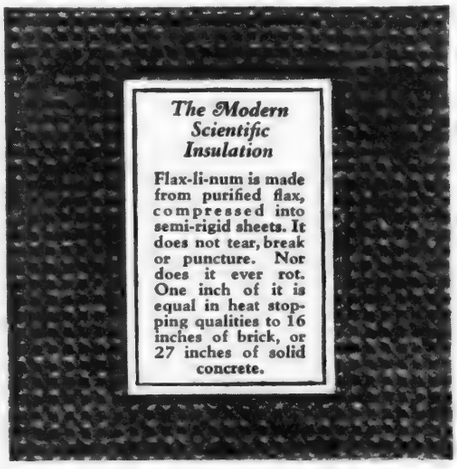
The GRAYBAR BUILDING *New York*



WHERE insulation problems are magnified by the size of the job, FLAX-LI-NUM is preferred by many architects. In the great Graybar Building, New York, architects, Sloan and Robertson, specified one-inch FLAX-LI-NUM to eliminate condensation as well as expansion and contraction cracks. The roofing was done by the Tuttle Roofing Company. The general contractors, Todd, Robertson and Todd Corporation.

For Industrial Buildings

FLAX-LI-NUM, one inch thick, is especially effective as roof insulation for large industrial and office buildings. Its use in many of the largest buildings in the country demonstrates the fact that it has been tried and proved. As a roof insulation, to protect top floors from the heat and cold, it results in great fuel savings. In addition, it is easy to lay and conforms readily to the form of the roof deck.


The Modern Scientific Insulation
Flax-li-num is made from purified flax, compressed into semi-rigid sheets. It does not tear, break or puncture. Nor does it ever rot. One inch of it is equal in heat stopping qualities to 16 inches of brick, or 27 inches of solid concrete.

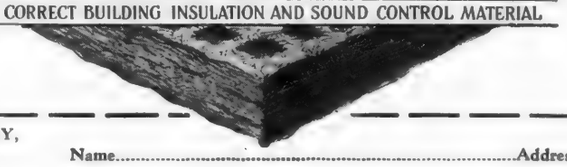
For Homes Large and Small

Insulation has become a necessity in home building. FLAX-LI-NUM, in ½-inch form, utilizing the scientific advantages of the 2-air-space method exclusively in the field, has established leadership as insulation for home use. The FLAX-LI-NUM is installed to form two air spaces in the walls. In this way, according to U. S. Bureau of Standards tests, ½-inch material is equal in insulation value to ¾-inch material used as a plaster base or in contact with the sheathing. Full details sent on request.

FLAX-LI-NUM INSULATING COMPANY, *St. Paul, Minnesota*

Flax-li-num

A CORRECT BUILDING INSULATION AND SOUND CONTROL MATERIAL



FLAX-LI-NUM INSULATING COMPANY,
St. Paul, Minnesota

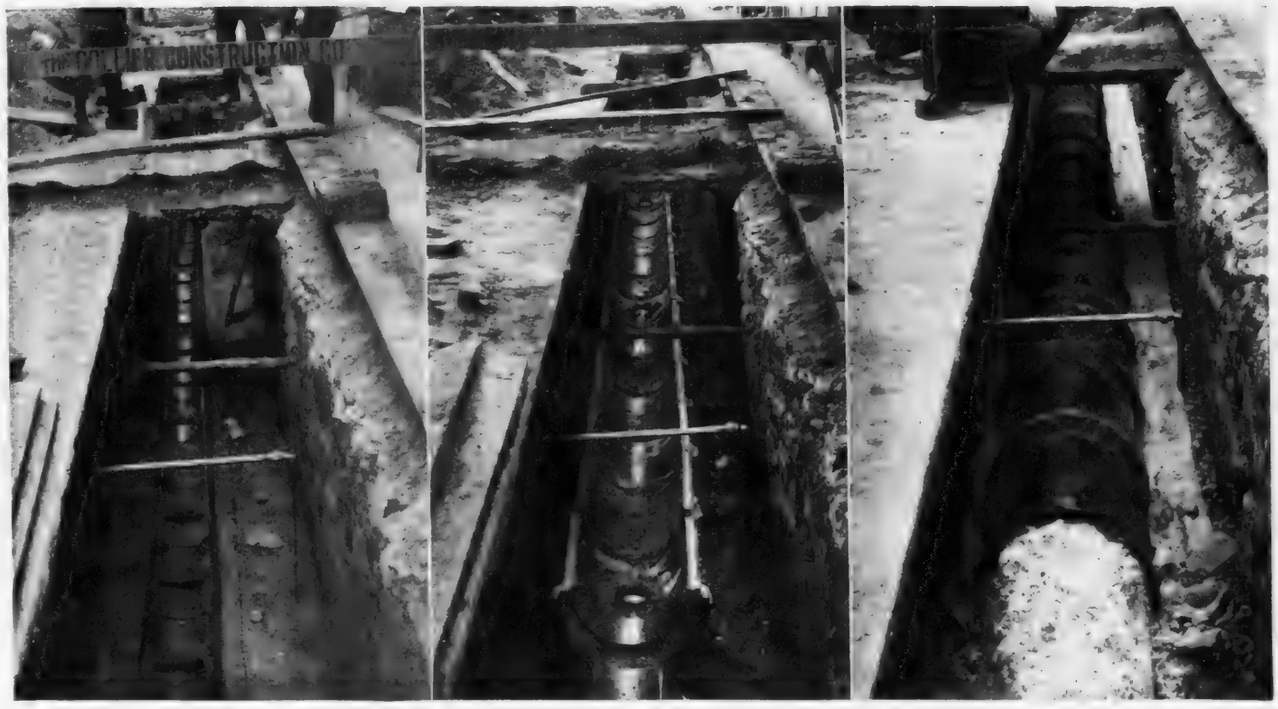
Send me complete information about Flax-li-num.
Also facts about the 2-air-space-method.

HV-8

Name..... Address.....

City..... State.....

Another Utility Company Installs RIC-WIL



Ric-wiL Base Drain Foundation in place, ready for setting on of bottom conduit halves and pipe supports.

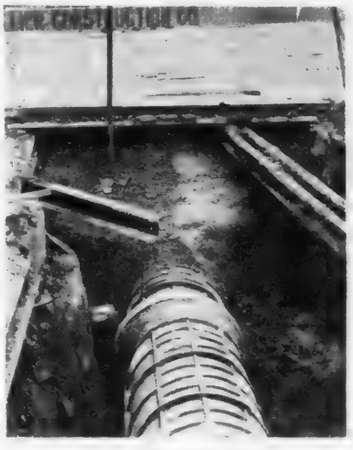
Ric-wiL bottom conduit halves and roller pipe supports installed. Pipe supports carried independently of conduit on base drain.

Part of Ric-wiL Conduit complete, ready for backfill. Note Dry-paC Waterproof Insulation and filter cloth over broken stone to keep dirt out of drainage system.

NEARLY a mile of underground steam line has been added this summer by the Akron Steam Heating Company, subsidiary of the Northern Ohio Power & Light Company, to its central heating service in the city of Akron, Ohio. These new lines are insulated and protected with Ric-wiL Underground Conduit, Type F, and Dry-paC (waterproof) Filler.

"Rapid time was made on the Main street line, less than a month being required to complete the job," reports "The Northern Light," official magazine of the Northern Ohio Power and Light Company. This Main Street line was 1010 feet long. 10 inch steam pipe and 4 inch return were used. The design and construction of Ric-wiL made this possible, narrow trench and unusually rapid assembly characteristic of Ric-wiL Conduit.

Ric-wiL Heavy Duty Cast Iron Conduit. Used where lines run close under street surfaces.



At Evansville, Indiana, the Southern Indiana Gas & Electric Company installed 2500 ft. of 12" high pressure main in Ric-wiL Conduit this summer. Commonwealth Power Co., Jackson, Michigan, Engineers. The Collier Construction Co., Cleveland, Ohio, were the contractors on this as well as the Akron job.

A Ric-wiL representative will gladly call and explain these two jobs and other Ric-wiL installations to utility companies contemplating underground steam line construction. Just drop us a line.

THE RIC-WIL COMPANY
1566 Union Trust Building
Cleveland, Ohio

Offices in Principal Cities

Hot Water Heating Systems Using Wainwright Heaters

Wainwright heaters used in the hot water heating system of a group of buildings, including a hotel, occupying approximately eight blocks in New York City. Temperature of the water is varied in the central heating plant according to outside weather to provide comfortable room temperatures.

Wainwright hot water heaters are built to operate with either exhaust or live steam. The temperature of the entire hot water heating system is controlled at one central point. Regulating the circulating water according to outside weather conditions procures comfortable heating the entire winter season.

The heaters shown herewith are designed to raise the temperature of 6,000 gal. per min. from 140 deg. to 180 deg. F., when supplied with steam at 5 lb. pressure.

Wainwright heaters are built for installation in any size project, hotels, apartments and hospitals

FOSTER WHEELER CORPORATION
165 Broadway, New York, N. Y.
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Foreign Associates:—
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ARMO UNIT COAL PULVERIZERS
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CONDENSERS COOLING TOWERS
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EXPANSION JOINTS FEED WATER HEATERS

FOSTER WHEELER

FRACTIONATING TOWERS HEAT EXCHANGERS
STEAM JET AIR PUMPS SUPERHEATERS
TANK STILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACES
BRASS AND COPPER TUBING AND PIPE

Nugent Crank Case Fuel Oil Filter

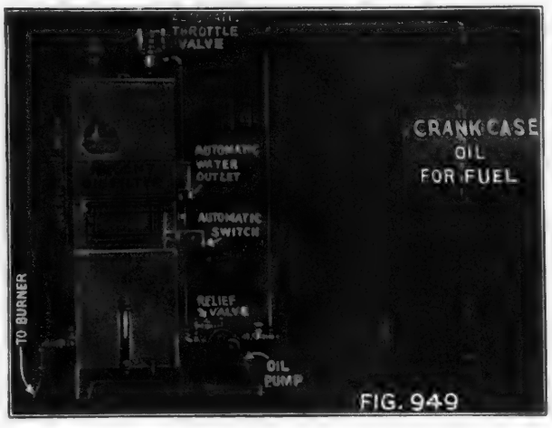

FIG. 949

HEAT YOUR BUILDING WITHOUT COST
BY BURNING DISCARDED CRANK CASE OIL
NO MORE BURNER TROUBLE
Write for catalog

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Oil Filters
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Oil Pumps

NUGENT TRADE MARK

Full Automatic

Any Capacity

Read this Letter

MONARCH GARAGE
1122-1130 HOLLYWOOD AVENUE AT THE L
CHICAGO, ILL.

Wm. W. Nugent & Co. December 19,1927.
Chicago,Ill.

Gentlemen:-

About a year and a half ago we purchased from you a Nugent Oil Filter and motor driven oil pump to filter automobile crank case oil for our oil burner.

This purchase has been one of the best investments we ever made, because the apparatus paid for itself in less than three months. We operate our burner on the filtered crank case oil entirely, consequently we have no fuel bills.

The filter removes the water, dirt, grit, and carbon from the oil so efficiently that the fine mesh strainer at the burner never has to be cleaned, and the burner operates perfectly.

Cleaning the filter requires only ten minutes twice a week and there is no other upkeep to the filter, as the filtering elements will last for years without renewing.

We are very pleased with the filter and pump as well as the service you have given us. We highly recommend your apparatus to anyone.

Very truly yours,

MONARCH GARAGE
By E. E. Kelly

To make your underground steam mains safe and permanently tight

Welded underground or overhead mains can be made continuous and highly flexible by installing BADGER WELDING SELF-EQUALIZING EXPANSION JOINTS. They weld right into the pipe line of which they become an integral part.

The one-piece, multi-corrugated expansion elements introduce no sliding joints. They are made by special machinery that produces a uniform curvature and uniform thickness of metal throughout the corrugations. Heavy external equalizing rings distribute the movement evenly among all the corrugations and protect the expansion element against wear. No packing is used and maintenance costs are therefore reduced to nothing.

Standard guide bearings for anchorage and keeping the pipe in alignment can be furnished. These bearings are bedded in concrete piers inside of the trench. For anchorages, the strap is welded to the pipe on both sides.

Guaranteed for all working pressures to 200 lbs. Adapted to superheat when equipped with a telescoping Monel Metal sleeve.

Write for Bulletin

BADGER ENGINEERING SERVICE

Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products: Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work, Copper Boilers.

E. B. BADGER & SONS CO., 75 Pitts Street, Boston, Mass.

New York: 271 Madison Ave. *Representatives in all principal cities* Chicago: 2831 South Parkway

BADGER EXPANSION JOINTS

ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · E. B. BADGER & SONS COMPANY · TRADE MARK

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Consulting Engineer: C. S. Atkins, Chicago
Engineer (Swimming Pool): G. S. Williams, Ann Arbor
Heating Engineers: Schumacker & Backus, Ann Arbor

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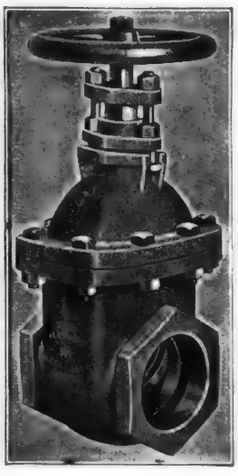
40 South Street HARTFORD, CONN.
New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, Los Angeles, San Francisco and other principal cities. Consult telephone book.

Winter Swimming!

One of the many uses to which Whitlock Heaters are put is that of heating the water for swimming pools. A notable installation is that in the Michigan Union .... water always at the desired temperature. In planning for hot water for any service, a Whitlock Hot Water Engineer can help you.

WHITLOCK HEAT TRANSFER PRODUCTS

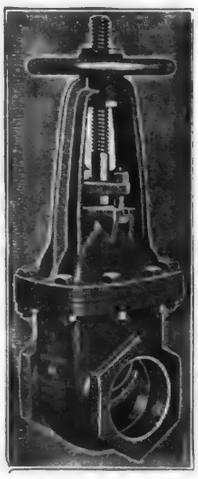
IRON BODY GATE VALVES



SCREWED, FLANGED
AND
HUB END STYLES

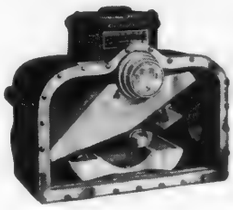
NON-RISING STEM
AND
O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings



Illinois Malleable Iron Company
1801 Diversey Parkway Chicago, Ill.

Over 50 Years Experience to draw from when you use ADSCO Specialties



ADSCO Simplex and Rotary Condensation Meters for metering steam condensation. For use wherever steam is to be accurately measured by the condensation. Where live steam flow is to be measured, use the St. John Steam Flow Meter.

ADSCO Red Diamond Brand Casing. The ideal combination of insulation and conduit for underground steam lines conveying saturated steam up to 50 pounds pressure. For higher pressures, ask for recommendations, stating operating conditions.

ADSCO Model P Variator for pressures up to 125 pounds. Takes up expansion and contraction. Never requires packing nor any attention whatever.

WHEN you use ADSCO Specialties for steam lines—underground or aerial—high or low pressure—you get more than just so many expansion joints, variators, steam traps, reducing valves, gate valves, or other products.

You are privileged to draw upon ADSCO's experience of over fifty years in designing and installing steam lines for every purpose. The recommendations of ADSCO engineers may save you thousands of dollars in installation costs, or prevent some costly mistakes that might be discovered only when too late.

When you use ADSCO equipment, you know that ADSCO engineers will cooperate with you in obtaining the most practical layout and efficiently designed lines that will give years of uninterrupted service.

Send us your blue prints, and we will be glad to make suggestions and quote prices on the ADSCO equipment that is being used by over 90% of the large District Heating Companies.

AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICE AND WORKS
NORTH TONAWANDA, N.Y.

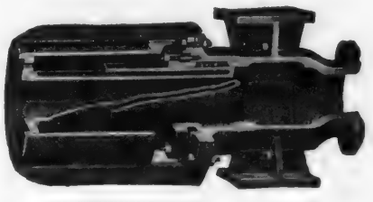
ADSCO

SPECIALTIES FOR UNDERGROUND OR AERIAL STEAM MAINS
HIGH OR LOW PRESSURE

Expansion Joints—Meters—Casing—Gate Valves—Steam Traps—Reducing Valves.

ADSCO Empire Steam Trap for low pressure. Capacity ranges from vacuum to 20 pounds pressure. Extremely simple and dependable, insuring continuous, carefree service at negligible maintenance.

ADSCO Nelson Gate Valve for 400 pounds working steam pressure. Completely mounted with non-corrosive metal. Designed for continuous, dependable service. Other valves for lower pressures.



ADSCO Duplex-Sleeve Guided Expansion Joint for pressures up to 500 pounds, and any temperature up to 750° F. Air-cooled slip eliminates packing trouble, and insures years of trouble-free service.

For Priming Boilers
For Foaming Boilers
For Sluggish Boilers
For That Unsteady Water Line

Remember!

Our Threefold Guarantee

1. Leading boiler and heating appliance manufacturers specify Vinco for the equipment they sell you.

2. Your money back if Vinco does not do all we claim for it, but,

3. Our "certified chemically correct" service sees your most puzzling job through with you, if you ask for it.

NOW IS THE TIME

A VINCO CLEANING for all heating systems you put in order will keep your customers and win you new ones.

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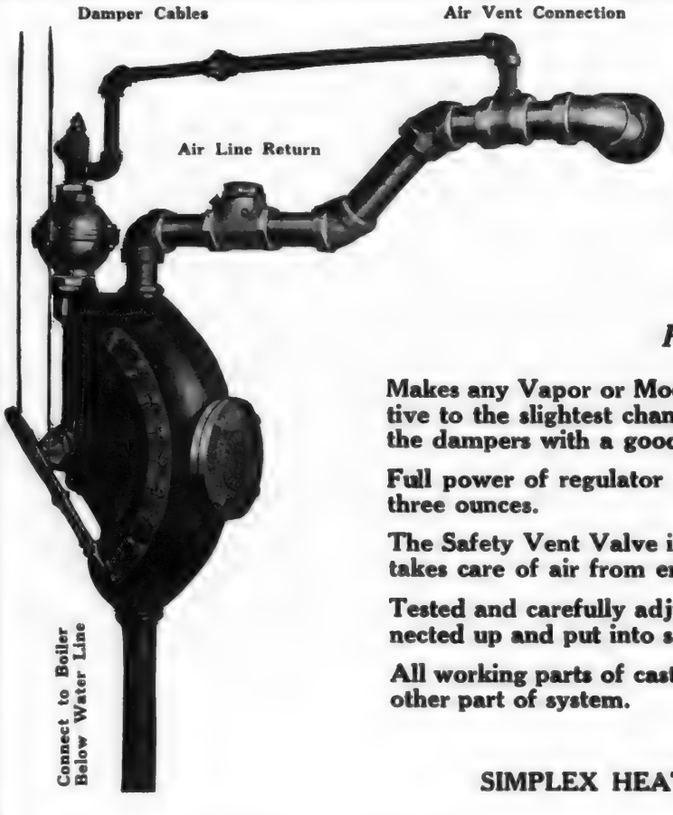
STOCKED BY
Leading Jobbers Everywhere.



Wiley

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

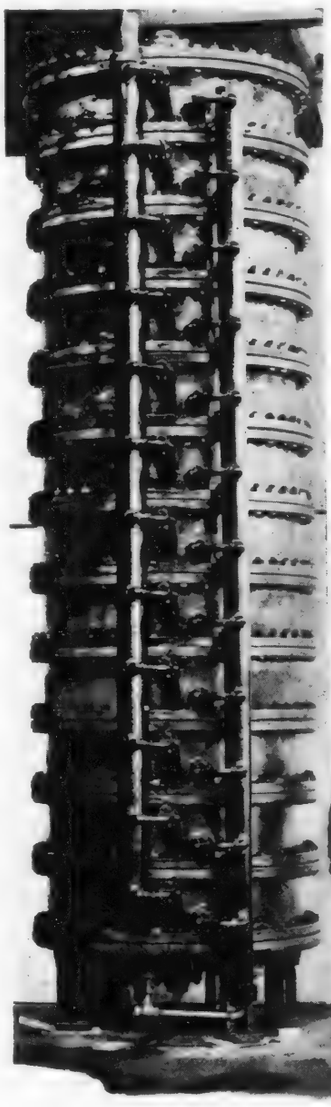
Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

We Make Any Size

of Heat Transfer Apparatus

YOUR particular requirements for heat transfer apparatus, whether large or small size, can be most advantageously produced by National. We offer features which add efficiency and longer life, backed by 45 years of experience on installations of common or difficult nature.



Each job is designed by National engineers and fabricated in a modern plant with all facilities for producing high-grade work.

Specialists in

FEED WATER HEATERS
OIL HEATERS OR COOLERS
AIR COOLERS
EVAPORATORS

We will be pleased to send a National engineer to consult with you. Send for our bulletin describing National Heaters.

This unusual job designed and built by National serves as a Fuel Oil Heater.

NATIONAL

HEAT TRANSFER APPARATUS

The National Pipe Bending Co.

120 River Street *Established 1883* **New Haven, Conn.**

BOSTON NEW YORK PHILADELPHIA

McKEE AUTOMATIC WATER FEEDERS

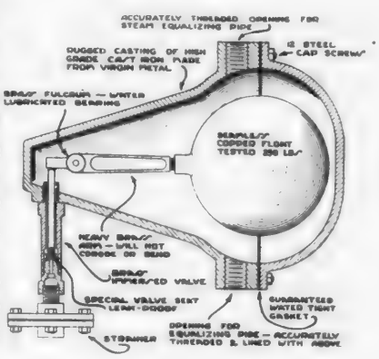
for Low Pressure Boilers

(UP TO 15 LBS. PRESSURE)

THE McKee Automatic Water Feeder is used primarily for adding new make up water to low pressure heating boilers having an operating pressure of not more than 15 lbs. The McKee Water Feeder automatically controls the admittance of new make up water. It maintains a constant water line in the boiler which does not vary more than 1/4" from normal at any time.

The entire feeder is ruggedly constructed and built to render real service. The casting is made from very high grade cast iron and has a uniform thickness. The float is of seamless copper tested at high pressure. All other parts are of heavy brass. The bearing at the fulcrum is water lubricated. The heavy brass float arm will not corrode or bend.

The superiority of the McKee Water Feeder is found in its simplicity. There are no working parts inside to corrode and cause trouble. The water enters the feeder through the brass immersed valve. A special valve seat, guaranteed leak-proof, is an absolute assurance against flooding of boiler.


ACCURATELY THREADED OPENING FOR STEAM EQUALIZING PIPE
RUGGED CASTING OF HIGH GRADE CAST IRON MADE FROM VIRGIN METAL
½ STEEL CAP SCREWS
BRASS FULCRUM — WATER LUBRICATED BEARING
SEAMLESS COPPER FLOAT TESTED 250 LBS.
HEAVY BRASS ARM — WILL NOT CORRODE OR BEND
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SPECIAL VALVE SEAT LEAK-PROOF
GUARANTEED WATER TIGHT GASKET
STRAINER
OPENING FOR EQUALIZING PIPE — ACCURATELY THREADED & LINED WITH BRASS

F.O.B. $25.00 ROCKFORD

A Positive Insurance Against Damage From Low Water

Write for complete information and Jobbers' Discounts.

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ROCKFORD 804 So. Main St. ILLINOIS

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Connor Co., Inc., The W. B., New York.
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Johnson Service Co., Milwaukee, Wis.
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Wing Mfg. Co., L. J., New York.

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Burnham Boiler Corp., Irvington, N. Y.
Coatesville Boiler Works, Coatesville, Pa.
Combination Boiler Co., Benton Harbor, Mich.
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Gorton Heating Corporation, New York.
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Stanwood Corporation, Cincinnati, Ohio.
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Combination Boiler Co., Benton Harbor, Mich.
Johnston Brothers, Inc., Ferrysburg, Mich.

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Frost Mfg. Co., Galesburg, Ill.
Heggie-Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
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Stanwood Corporation, Cincinnati, Ohio.
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Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

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Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

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COOLERS, OIL
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National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Whitlock Coil Pipe Co., Hartford, Conn.

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Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
Foster Wheeler Corporation, New York.
General Air Filters Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

COPPER BOILERS
Badger & Sons Co., E. B., Boston, Mass.

COPPER KETTLES
Badger & Sons Co., E. B., Boston, Mass.

COVERING, BOILER, PIPE, ETC.
American District Steam Co., North Tonawanda, N. Y.
Banner Rock Products Co., Alexandria, Ind.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

DAMPERS, DUCT
Buckeye Blower Co., The, Columbus, Ohio.
Clarage Fan Co., Kalamazoo, Mich.

DAMPER LOCKS, SELF-LOCKING
Northern Weatherstrip Co., Duluth, Minn.

DEHUMIDIFYING APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

DISTILLERS, (WATER)
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

DRAFT APPLIANCES
Draft-A-Justor Corp., Chicago, Ill.
International Fuel Service Corp., Bridgeport, Conn.

DRYING SYSTEMS
(See Air Cooling & Drying Systems).

DUST COLLECTING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.

DUST COLLECTORS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

ENGINES, STEAM, AUTOMATIC
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

ENGINES, STEAM, HIGH SPEED
American Blower Co., Detroit, Mich
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio

EQUALIZING LOOPS
Hoffman Specialty Co., New York.
Sarco Co., Inc., New York.

EVAPORATORS, BOILER FEED MAKE-UP
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

EXHAUST HEADS
Aeolus Dickinson, Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EXHAUST SYSTEMS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

EXHAUST SYSTEMS, ACID
Duriron Company, Inc., The, Dayton, O.

EXPANSION JOINTS
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Foster Wheeler Corporation, New York.
Fulton Syphon Co., Knoxville, Tenn.
Gradon Mfg. Co., Philadelphia, Pa.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

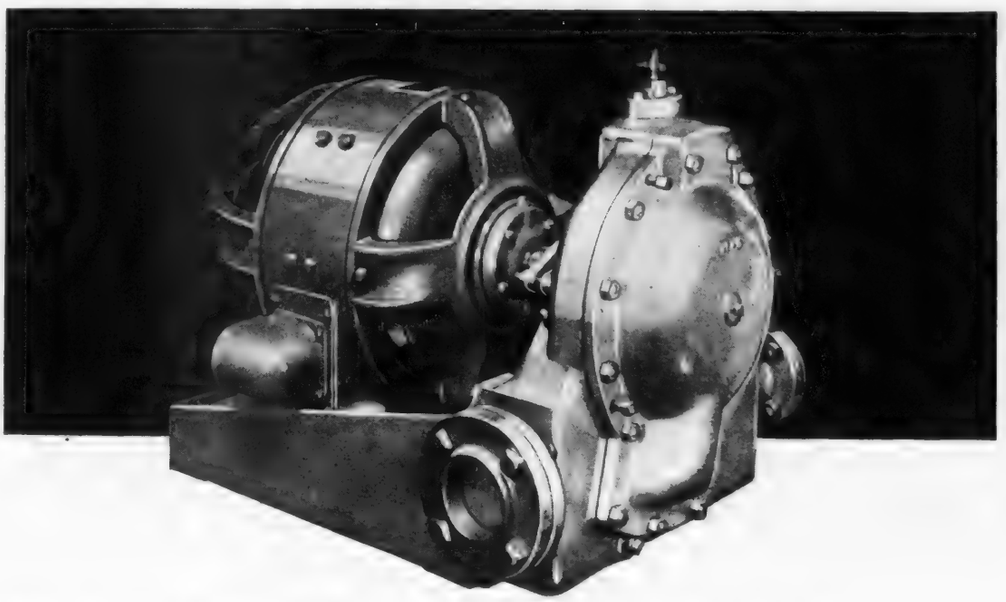
FANS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FANS, DISC PRESSURE
DeBothezat Impeller Co., Inc., New York.

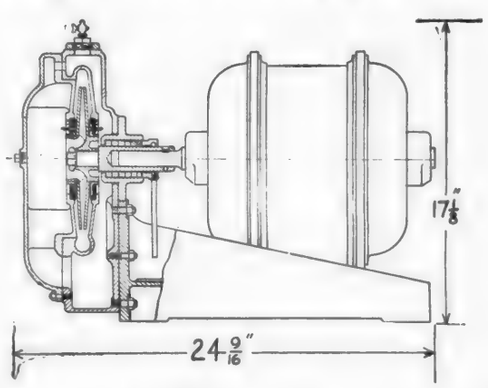
FANS, SUPPLY AND EXHAUST
American Blower Co., Detroit, Mich
Autovent Fan & Blower Co., Chicago Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

FEEDERS, BOILER
Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Walworth Co., New York.

This centrifugal is different!



Motor and pump on the same shaft
No bearings in pump casing
Only one stuffing box
Impeller removable without disturbing packing



Sectional view of the 1½ in. size Jennings Centrifugal. The dimensions given show the remarkable compactness of this unit which handles 75 g.p.m.

FOUR features that make this pump simple in construction and easy to take care of. Compactness is secured at no sacrifice in efficiency.

Merely unbolting the pump head gives ready access to the interior for cleaning or inspection. The impeller can be removed without touching the packing or disturbing the shaft alignment.

Made in 1¼, 1½, 2, 3, 4, and 6 in. sizes. For capacities up to 1000 g.p.m. Heads up to 250 ft.

Bulletin 52 is the one to write for.

Jennings Centrifugal Pumps are recommended for circulating hot and cold water; boosting city water pressure; handling water in air washing and conditioning; removing condensate from heating systems, blow down from soot blowers and superheaters, exhaust drips from steam ejector air pumps and other auxiliaries; pumping refrigerator can and core water, evaporator feed, cooling tower and condenser water, screen wash water, oil engine jacket water, ash sluicing water.

Jennings Pumps

THE NASH ENGINEERING CO 81 WILSON ROAD, SOUTH NORWALK CONN.

FILTERS, (AERATING)
Davis Engineering Corp., New York.

FILTERS, CRANK CASE OIL
Nugent & Co., Inc., Wm. W., Chicago, Ill.

FILTERS, FEED-WATER
Davis Engineering Corp., New York.

FITTINGS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FITTINGS, FLANGED
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York

FLANGES
Clow & Sons, James B., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, ASBESTOS
Jenkins Bros., New York.
Johns-Manville Corp., New York.

GASKETS, METALLIC
Jenkins Bros., New York.

GASKETS, RUBBER
Jenkins Bros., New York.

GAUGE BOARDS
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow & Sons, James B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGE GLASSES
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Jenkins Bros., New York.

GAUGES, ALTITUDE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.

GAUGES, DRAFT
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGES, HYDRAULIC
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

GAUGES, OUNCE GRADUATED
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

GAUGES, PRESSURE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

GAUGES, TANK
King-Seeley Corp., Ann Arbor, Mich.

GAUGES, VACUUM
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

GAUGES, VACUUM (COMPOUND)
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

GAUGES, WATER
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

GENERATOR COOLING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

GOVERNORS, (PUMP)
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Webster & Co., Warren, Camden, N. J.

GRATES, DUMPING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Titusville Iron Works Co., The, Titusville, Pa

GRATES, ROCKING
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

GRATES, SHAKING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING AND DUMPING
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING, CIRCULAR
Fitzgibbons Boiler Co., Inc., New York.
Pyramid Iron Products Corp., New York.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, STATIONARY
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

HEAT CABINETS
Clow & Sons, James B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Metal Stamping Co., Long Island City.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Trane Co., The, LaCrosse, Wis.

HEATERS, AIR, FAN SYSTEM
Aerofin Corp., Newark, N. J.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

HEATERS, DOMESTIC WATER
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Excelso Products Corporation, Buffalo, N. Y.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, ELECTRICAL UNIT
American Blower Co., Detroit, Mich.

HEATERS, FEED WATER, (CLOSED)
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, FEED WATER, (OPEN)
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

HEATERS, FUEL-OIL
Alberger Heater Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, UNIT
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., The, LaCrosse, Wis.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

HEATING SYSTEMS, GAS
Clow & Sons, James B., Chicago, Ill.

HEATING SYSTEMS, VACUUM
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, VAPOR
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, WATER
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Mueller Co., Decatur, Ill.
Page Boiler Co., Wm. H., New York
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

HUMIDITY CONTROL
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

INSTRUMENTS, ELECTRIC MEASURING
Bristol Co., The, Waterbury, Conn.

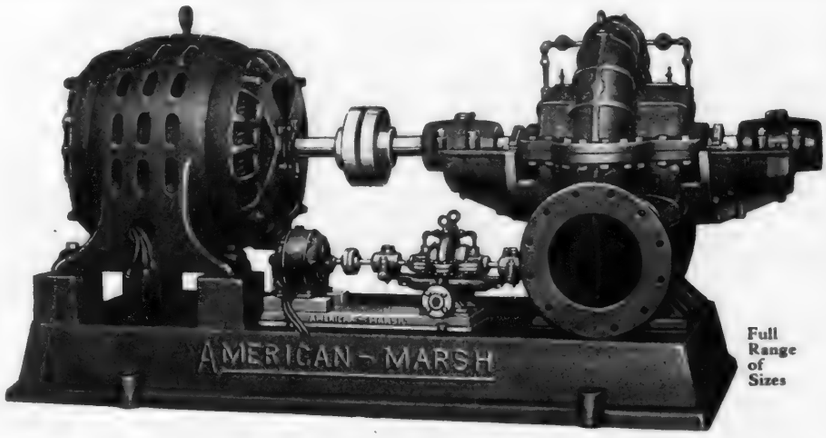
INSTRUMENTS, INDICATING AND RECORDING
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

INSULATION, BOILER, PIPE, ETC.
(See Covering, Boiler, Pipe, etc.)

INSULATION, BUILDING
Banner Rock Products Co., Alexandria, Ind.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.
Johns-Manville Corp., New York.

MANOMETERS
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.

Have You the Data on These PUMPS?



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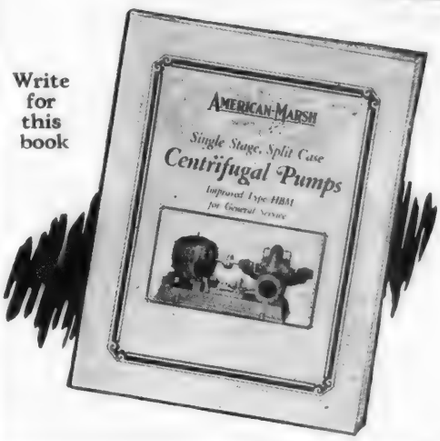


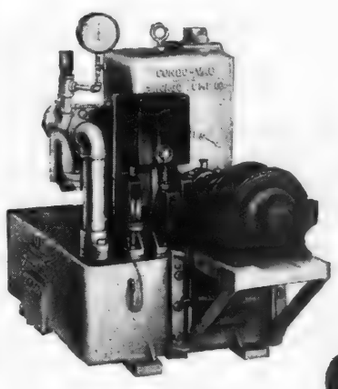
THERE'S a genuine story of achievement back of these new American-Marsh HBM Single Stage, Split Case Centrifugals—higher efficiencies—end thrust eliminated—impellers hydraulically balanced—conservative ratings obtained in service as well as on the test block—heavy duty construction throughout. Use HBM Pumps for water supply, boiler feed, air washer service, etc. Use them to cut operating cost; to reduce maintenance. Ask for Bulletin 38, or for the cooperation of American-Marsh engineers.

AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN, U. S. A.

AMERICAN-MARSH

New **HBM Centrifugal Pumps**

In the winter CONDO-VAC is the thing!



CONDO-VAC

Condensation Vacuum Pump
Fig. 1990

Heating Contractors and Engineers have made "Condo-Vac" a favorite by their own prescription.

Simplicity of installation, simplicity of operation and simplicity in maintenance are designed and built in the "Condo-Vac."

"Condo-Vac" needs no pit for installation—base and receiver are one. Air impeller and water impeller are on one shaft, and turned over by one motor.

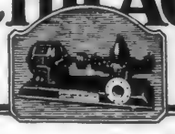
Operation is controlled by vacuum regulator and a float switch.

"Condo-Vac" is designed for efficient service and long life.

"Condo-Vac" is a complete unit, connected up and ready-to-work as it leaves the factory.

Heating men are specifying "Condo-Vac" because it is made to their specification.

CHICAGO PUMP COMPANY



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BILGE-FIRE-HOUSE-VACUUM

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1 Madison Ave., NEW YORK. Phone, Ashland 9258

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DeBothezat Impeller Co., Inc., New York
Mason Regulator Co., Boston, Mass.
New York Blower Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

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Chace Valve Co., W. M., Detroit, Mich.

METERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.

METERS, FEED WATER
Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

METERS, FLOW
Foxboro Co., Inc., The, Foxboro, Mass.
Spray Engineering Co., Boston, Mass.

METERS, PITOT TUBE
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

METERS, STEAM
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Builders Iron Foundry, Providence, R. I.

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Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

NOZZLES, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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Automatic Burner Corp., Chicago, Ill.
Caloroil Burner Corp., New York.
Cleveland Steel Products Corp., Cleveland, Ohio
Electrol, Inc., St. Louis, Mo.
Grant Home Heater Corp., Jersey City, N. J.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
McIlvaine Burner Corporation, Chicago, Ill.
Nu-Way Corporation, Rock Island, Ill.
Pascoe Company, The Wm. H., Chicago, Ill.
Petroleum Heat & Power Co., New York.
Preferred Oil Burners, Inc., Peoria, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.
York Oil Burner Co., York, Pa.

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Buffalo Forge Co., Buffalo, N. Y.
Draft-A-Justor Corp., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Teesdale Mfg. Co., Grand Rapids, Mich.
Preferred Utilities Mfg. Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster Electric Co., Racine, Wis.

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American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Webster Electric Co., Racine, Wis.

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Duriron Company, Inc., The, Dayton, O.

PIPE, CAST IRON
Clow & Sons, James B., Chicago, Ill.

PIPE, STEEL
Clow & Sons, James B., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

PIPE, WOOD
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE BENDING
Badger & Sons Co., E. B., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (WOOD)
American District Steam Co., North Tonawanda, N. Y.
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE HANGERS
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York

PIPE THREADING & CUTTING MACHINES
National Pipe Bending Co., New Haven, Conn.

PRESSURE REDUCING VALVES
(See Regulators, Pressure).

PULLEYS, VARIABLE SPEED
Horton Mfg. Co., Minneapolis, Minn.

PUMPS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PUMPS, CENTRIFUGAL
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.

PUMPS, CENTRIFUGAL, VACUUM HEATING
Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

PUMPS, CONDENSATION
American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, OIL
Connor Co., Inc., The W. B., New York.
Janette Mfg. Co., Chicago, Ill.
Nugent & Co., Inc., Wm. W., Chicago, Ill.

PUMPS, RECIPROCATING STEAM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS, SUMP
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, TURBINE
Chicago Pump Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, VACUUM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

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Acme Radiator Shield Co., Cincinnati, Ohio.
American Metal Products Corp., St. Louis, Mo.

RADIATOR HANGERS
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.

RADIATORS, BRASS
Rome Brass Radiator Corp., New York
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

RADIATORS, GAS HEATED
Automatic Gas Steam Radiator Co., Pittsburgh, Pa.
Clow & Sons, James B., Chicago, Ill.

RADIATORS, STEAM & WATER
American Radiator Co., Buffalo, N. Y.
Burnham Boiler Corp., Irvington, N. Y.
Clow & Sons, James B., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Richmond Radiator Co., New York.

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Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

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American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

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Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

REGULATORS, DAMPER
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Draft-A-Justor Corp., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Syphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

REGULATORS, PRESSURE
American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kalmer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Teeple Co., L. R., Portland, Oregon

REGULATORS, TEMPERATURE
(See Temperature Control).

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Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

SEPARATORS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Webster & Co., Warren, Camden, N. J.

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Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

SPRAY NOZZLES
(See Nozzles, Spray).

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American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Nugent & Co., Inc., Wm. W., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, WATER
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

TEMPERATURE CONTROL
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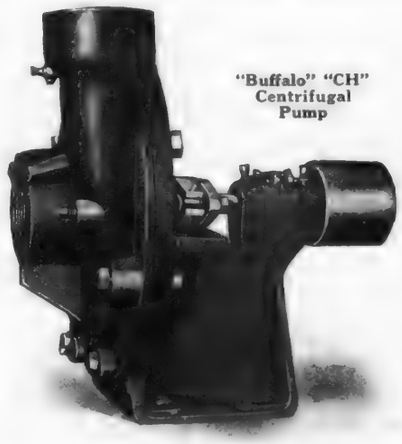
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Fulton Syphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Raymond, F. I., River Forest, Ill.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Teeple Co., L. R., Portland, Oregon
Thrush & Co., H. A., Peru, Ind.
Time-O-Stat Corp., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

THERMOMETERS, RECORDING & INDICATING
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York



"Buffalo" "CH" Centrifugal Pump

Pumping from 10 to 500 G.P.M. against a "Head" of from 10 to 120 feet.

—for general utility service

What is your pumping problem? If the conditions are within the range of gallons per minute and "head" as given above, a "CH" Pump is your best bet for trouble-free service at the right price.

No matter if you want to install this pump in an industrial plant, pump water to a construction job, or hook it to a Ford truck with a power take-off for portable service—a "CH" Pump offers you the biggest value for your money, especially when Buffalo Quality is considered.

Regardless of what your pumping problems are, send us complete details and we will tell you the "Buffalo" pump that will do your job.

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Buffalo Steam Pump Co.

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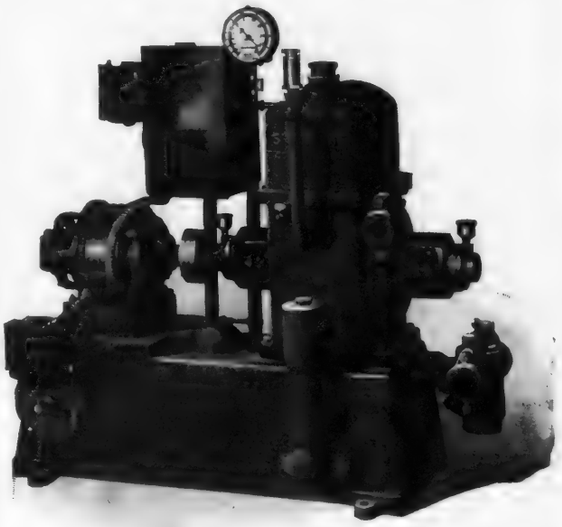
TOLEDO
WASHINGTON

In Canada
Canadian Blower & Forge Co., Ltd.,
Kitchener, Ont.

SKIDMORE



Which Will You Have

high or low water line in the system when operating on float control?

The Skidmore pump on interceptor base is designed to give low water line operation without pitting.

The unit is self contained, ball bearing, and operated by one motor. It produces vacuum on the system even when operating on float control, a desirable feature.

The unit consists of two pumps in one housing on one shaft, an air pump and a centrifugal pump for boiler feed. Motor and pump are mounted directly on interceptor base. This construction means compactness in design and minimum floor space occupied.

The automatic starter together with vacuum regulator and float switch are mounted on this unit. All wiring is installed at the factory.

Bulletin No. 5 illustrating this unit is now available.

SKIDMORE CORPORATION

General Offices and Factory

1535 Dayton St. CHICAGO, U. S. A.

Representatives in principal cities

Canadian Representatives, Darling Bros., Limited
120 Prince Street, Montreal

Powers Regulator Co., Chicago, Ill.

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Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Thrush & Co., H. A., Peru, Ind.
Time-O-Stat Corp., Milwaukee, Wis.

TRAPS, BUCKET

Trerice Co., H. O., Detroit, Mich.

TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.

TRAPS, INVERTED BUCKET (STEAM AND AIR)

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TRAPS, LIFTING

Lytton Mfg. Corp., Franklin, Va.

TRAPS, RADIATOR

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Armstrong Machine Works, Three Rivers, Mich.
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Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville Corp., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

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American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Trerice Co., H. O., Detroit, Mich.

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Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TUBING, COPPER AND BRASS

Wolverine Tube Co., Detroit, Mich.

TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

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Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

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American District Steam Co., North Tonawanda, N. Y.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

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American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Fulton Syphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelly Brass Works, Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.

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American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corporation, New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.

VALVES, BACK PRESSURE

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, BALANCED

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, BLOW-OFF

Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

VALVES, CHECK

Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Milwaukee Valve Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, FLOAT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, GLOBE, ANGLE & CROSS

Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Phila., Pa.
Walworth Co., New York.

VALVES, HYDRAULIC-OPERATING

Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Walworth Co., New York

VALVES, MAGNETIC

Absolute Con-Tac-Tor Corp., Elkhart, Ind.

VALVES, NON-RETURN

Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Capitol Brass Works, Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Syphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

VALVES, REDUCING

(See Regulators, Pressure).

VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Syphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York

VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Kainer & Company, Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Radiator Corp., Johnstown, Pa.
Thrush & Co., H. A., Peru, Ind.

VALVES, SAFETY

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Jenkins Bros., New York.
National Radiator Corp., Johnstown, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Walworth Co., New York

VALVES, STOP AND CHECK

(See Valves, Non-Return).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Lakeside Company, The, Hermansville, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

VENTILATING SYSTEMS, ACID

Duriron Company, Inc., The, Dayton, O.

VENTILATORS

Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Midwest Air Filters, Inc., Bradford, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VENTILATORS, MUSHROOM

Aeolus Dickinson, Chicago, Ill.
American Blower Co., Detroit, Mich.
American Metal Products Corp., St. Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill.

VENTILATORS, ROOF

Aeolus Dickinson, Chicago, Ill.

VENTILATORS, UNIT

American Blower Co., Detroit, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

WATER STERILIZERS

Clow & Sons, James B., Chicago, Ill

WEATHER STRIPS, METAL

Athey Co., Chicago, Ill.

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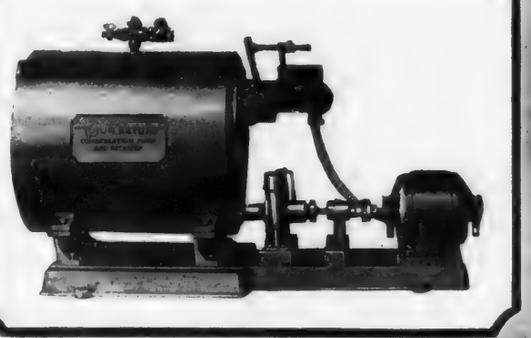

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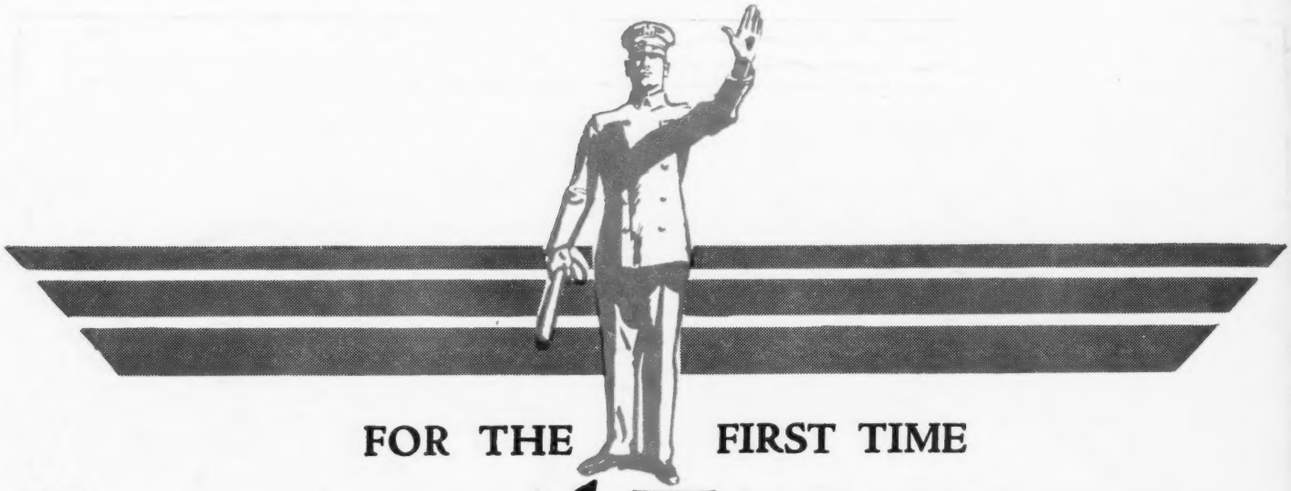

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